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SOFTWARE / SECURITY / PLAYABLE DEMOS / LINUX

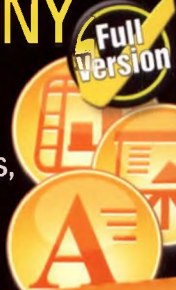
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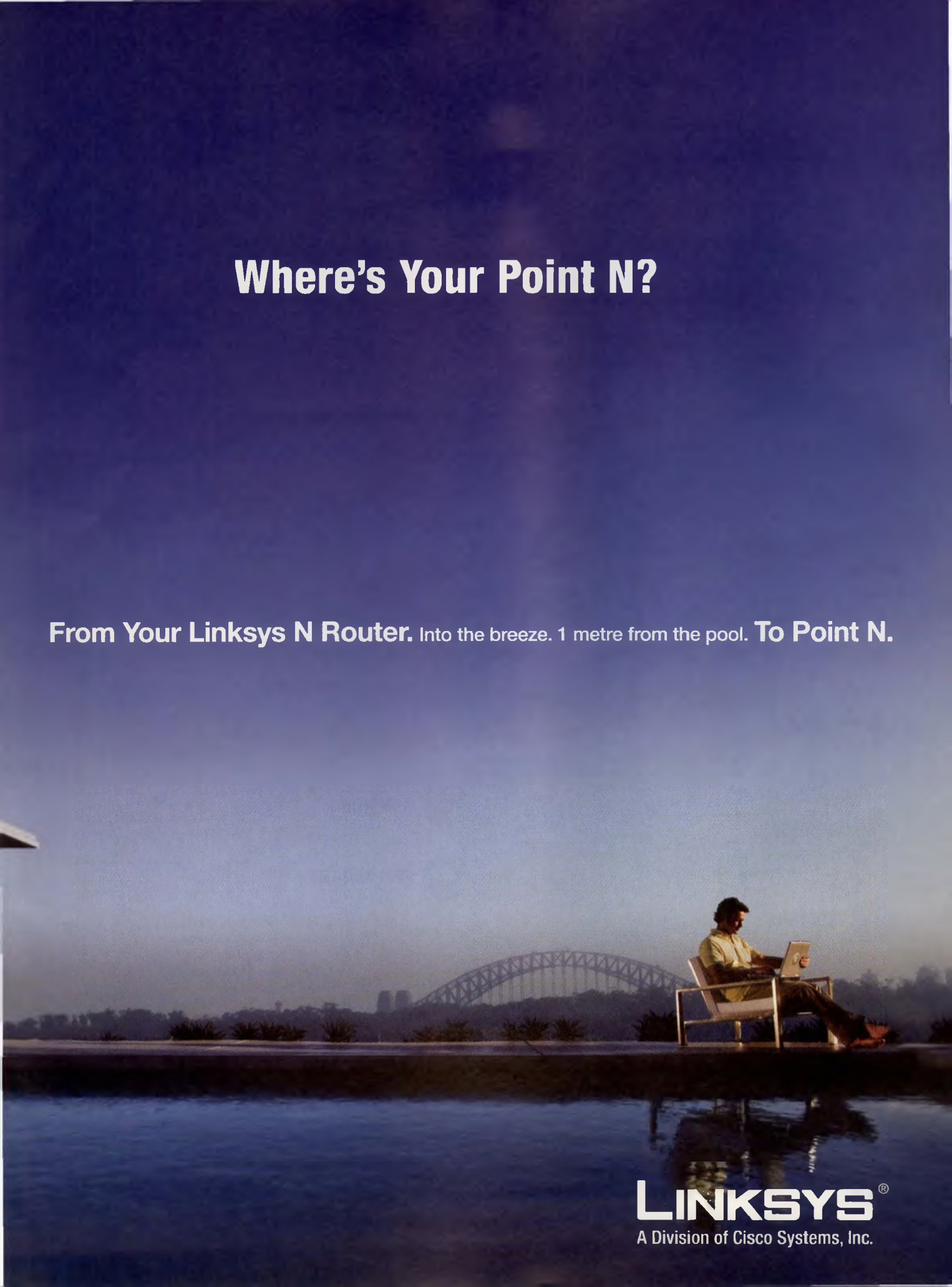
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Intel and AMD's
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This logo indicates a free, complete and unrestricted software package, available only on APC's cover DVD.

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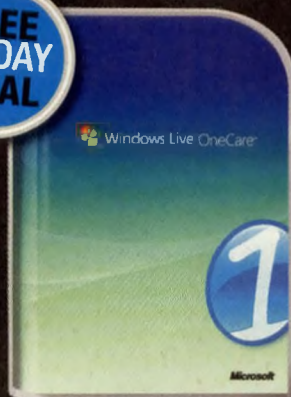
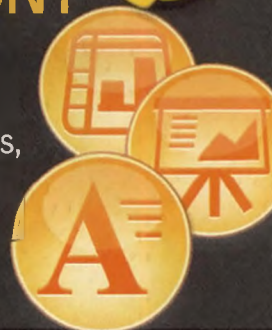
New versions of two of the hottest Linux desktop distros*



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editorial



TONY SARNO

You name the social networking service, and I'm on it: Facebook, Twitter, Orkut — even Cyworld, which is the biggest thing in South Korea (probably the most wired country on earth). Initially I was signing up just to see what all the fuss was about, and then got hooked on the whole voyeurism of it, constantly amazed at just how many of my instant new friends were prepared to broadcast intimate details of their lives, their late nights and their flings and flirts to me and others.

I recently found myself eagerly checking status reports on Facebook, which, like on Twitter, publishes brief updates posted by friends about what they're up to. I read that "David is enjoying a good cuppa," and "Steven is feeling like chicken tonight..." At that point, it struck me that the whole thing was an exercise in sheer banality and why was I even reading that stuff? It was in trying to answer this that the power of the social networks struck me: the information might have been banal, but I read the social updates because they were from my friends and that made them relevant. The power of Facebook is that it's a gated information community which lets me exclude all those I don't want to hear from. And it also wraps me in an environment that has a thousand ways of telling me what my friends are up to.

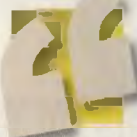
Strangely enough, I was having this epiphany at roughly the time Microsoft was

investing US\$270M to get 1.6% of Facebook. Right now, social networks are being used primarily for social interaction, and the applications available on them remind me of the ones in the early days of DOS, when they barely worked and each had its own UI. But if you want to get a message to your friends, or maybe even your customers, there are few more powerful or easier ways to reach them.

Imagine what can happen once social networking applications are developed not just for keeping up with friends, but with clients, customers, suppliers and anyone else that's relevant to your professional needs, with the whole lot being accessible on all devices (just as Facebook is now finally available on Blackberry) at all times. Now that's the revolution — the creation of an interactive communications universe tailored to you, that follows you and allows you to hear from just the people and companies you want (and lets you punish those who abuse the privilege by deleting them from your 'friends' list).

What a great opportunity for the community to start developing an open source social networking architecture that could also provide interoperability of sorts between the proprietary systems. It would be a chance to help develop the fabric of the next communications universe.

tsarno@acpmagazines.com.au



THE POWER OF SOCIAL NETWORKS: THE INFO MAY BE BANAL, BUT AS IT'S FROM FRIENDS THAT MAKES IT RELEVANT

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Internet Explorer 7 to stay with mothership

Stuff browser apps, we're sticking with Windows, the head of IE7 tells Angus Kidman.

Despite the growing popularity of browser-based packages such as Google Apps and its own experiments with delivering online document sharing via the now-in-beta Office Live Workspace, Microsoft doesn't foresee a future in which Internet Explorer is anything other than a series of services utilised by Windows.

Chris Wilson, Microsoft's platform architect for Internet Explorer, told APC that the benefits of having IE closely tied to Windows outweighed disadvantages such as problems troubleshooting the browser when things go wrong.

"There's benefits and there's costs to it," Wilson said, but Microsoft was not planning any further separation of the two products, he added. "To ship an operating system that didn't have a

browser in it wouldn't be sensible. It's a system service. The interesting part for us is we get to rely on the Windows system to provide capabilities for us."

Interestingly, relying on those services doesn't result in a smaller browser; the download of IE7 for XP (15MB) is two-and-a-half times the size of the Firefox equivalent (6MB). Wilson's explanation? "A lot of the things that make IE larger are really that it's delivered as a set of system services that are essentially atoms for Windows. You can use just parts of the browser. It's a componentised very specifically so you can do that."

While many Web 2.0-style applications have developed in a culture of collaboration, Wilson foresees difficulties in moving that model into applications, especially for business users. As an example, he

cites the Firefox add-in sub-culture, which he describes as "a really great user community". Microsoft wouldn't do that, though, as it would make troubleshooting so hard, he says.

It seems Microsoft doesn't have much room for the view that the browser on its own will become the main means of delivering applications. "There's two ways to think of a browser: one is as a user interface and the other thing is an implementation of a particular platform," Wilson said. The latter is deficient, he suggests: "The Web platform doesn't leverage local capabilities anywhere near enough. It doesn't have local graphics support, for instance, or local data."

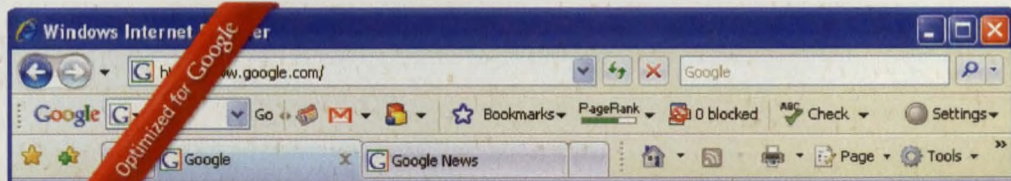
Google is attempting to solve some of those problems with its Gears initiative to allow web apps to be accessible offline, but Wilson isn't

convinced by that either. "I think it's an interesting step. I'm not totally sure why they choose the set of functionality that they did and not the other things that went along with that, but some of those things would be really hard to do. Developing real offline control and writing real offline web applications is really hard to do without a deployment model that the browser is managing."

Even without the technical problems, shifting into browser mode will also be confusing for typical PC users, he suggests. "As a user paradigm, I just don't think everything fits. When I'm using email, I don't like the Back button working the same way as it does in a browser. I'm not convinced that the browser interface will take the place of everything."



A browser apart? MS's IE7 head bucks the view that browser apps will supersede the traditional OS and apps configuration.



Porn **better at DRM** than Hollywood

Could the adult entertainment industry have the answer to online piracy?

The pornography industry may be the entertainment wing of the world's oldest profession, but it's been right on the cutting edge of internet technology ever since screens could hold enough pixels to satisfy lonely techies. Streaming video, web sites, and centralised identity services (for age-verification purposes) all made their mark, but the biggest decision was the one that the industry opted against — DRM.

Unlike more-respectable content producers, at least in their minds, online smut purveyors have historically treated piracy as a cost of doing business. Their costs are low, and the products on sale a commodity. As long as enough visitors were willing to click the button for some cut-price stimulation, the pirates rated a blip. In many cases, such piracy was even believed to be a form of advertising — like the justifications made by music pirates.

However, that seems to be a thing of the past. Online site Shane's World recently gathered together 65 major producers to discuss the problems, describing the current situation as: "The industry has really sort of dug its own grave." It's not just that only 15-20 per cent of copulation fans currently cough up their credit cards for fresh relaxation material; it's that, even more than music piracy, it's seen as a crime that you're not likely to get rapped for."

In many ways, the porn world's piracy problems present a vision of the future for regular film producers. Smaller files and downloads make their files as accessible to the mainstream as Hollywood movies will soon become, the target audience being kids growing up with the idea that everything should be free.

What's interesting is that instead of taking the Hollywood tack of DRM, DRM and more

DRM, the industry is looking at rather different tactics — from the founding of an RIAA-style team along the lines of Australia's AICO (Adult Industry Copyright Organisation) to be the public face of any dispute, to holding fire until quantum computing can put each video in hardcore cryptographic bondage.

However, it's the final one that makes the most sense. If videos can be easily pirated, pair them with things that can't, from simple T-shirts, to live events, or the convenience of one-click downloads at 2am. It's an idea that Hollywood's been reluctant to try, but one that makes the most sense. And if it has to come from the creators who bring the world such marvels as World of Whorecraft, so be it. In the end, everyone benefits.

Firefox **killing** web

As users applaud browser's ad-blocking system, online businesses fear ruin.

Thanks in no small part to an anti-advertising plug-in called Adblock Plus, the browser Firefox has achieved 400M downloads — that's around 500,000 downloads a day since the browser's release. Yet, while users applaud the technology which prevents adverts appearing as they surf the web, panicked web businesses are warning advertisers may be frightened off, starving web sites of cash. They warn the web could be damaged irreparably.

Some corners of the industry are revolting against Adblock Plus. Code has been developed to allow web site owners to detect the use of a Firefox and Adblock Plus combination (see <http://showip.net/adblock.php>).

New online campaigns exist to educate the public on the consequences of the Adblock Plus



Surfers love sites without adverts, but online businesses worry that the loss of revenue might damage the web.

Firefox extension. Some have evolved the code that appears on the above site into a fully-fledged blocking script, preventing those with Firefox and Adblock Plus from accessing the online content available — a tactic which is certain to spread.



One web site (www.whyfirefoxisblocked.com) argues that the blocking of online advertising is theft and has taken steps to combat this. It's of the belief that, demographically, Firefox users are a small percentage of those on the internet, and even

smaller when spending is involved. However, there is no visible mention on the site of a source with figures to back this up.

Murmurings of contempt towards advert blocking are sure to spread as an increasing number of portals pushing free content emerge. With no regular form of income, the advertising-revenue business model will be relied upon. Maybe the solution to these woes is excluding Firefox from such sites.

Despite the spat between Firefox and its detractors, spending on online advertising is on the up. During 2006 in the UK, over £2 billion (\$4.5M) was spent, targeting 31 million internet users (according to Internet Advertising Bureau research). In addition, internet expenditure, with a market share of 10.9 per cent, surpassed that of advertising in national newspapers.



Component shortage threatens industry

Laptop parts becoming scarce — flash memory and DRAM next.

Your next computer could end up costing a lot more than you bargained for. A recent report in the Asian trade journal *Taiwan Economic News* suggests that the world's largest PC manufacturers are struggling to obtain enough components to meet demand.

Dell, the world's second-largest notebook manufacturer, is already pushing overstretched contract manufacturer Quanta to increase shipments of LCD screens and laptop batteries, which is expected to cause Quanta to raise component prices.

Although APC expects any initial price rises to be absorbed in the short term by big-name system builders, smaller integrators forced to pay more for the scarce stock that hasn't already been earmarked by big names could find their profit margins slashed. Expect a slight hike in the price of consumer components, too.

This increased demand is mainly due to a shift in Dell's strategy; in the US, it has moved away from marketing directly to consumers and has entered into deals with big-name retailers such as Wal Mart, which put its units on sale on shop floors.

Acer and HP, which share a similar business model and many of the same OEMs, are said to also be feeling the pinch.

Meanwhile, Samsung — the world's largest producer of flash memory — was only able to meet 85 per cent of worldwide demand for its NAND modules in August due to a serious power failure that shut down six of its Seoul-based production lines.

PRICE HIKE

These supply problems stem from the widespread use of 'just in time' manufacturing, where the manufacturing process creates only enough units to meet current

demand. While this reduces storage and holding costs, it also amplifies any production issues to much more critical levels.

In Dell's case, it has stepped up its production of laptops for the retail market, and its already taxed factories are struggling to keep up. In Samsung's case, downtime of less than a day has led to heavy shortages, losses of around \$54 million, and what is likely to end up as a significant price hike to its many customers.

Supply and demand is a tricky business. While Samsung cannot get enough of its NAND flash chips out of the factory, it has been able to cover some of its issues by

switching some production facilities from NAND to DRAM.

This is especially fortuitous because DRAM manufacturers are feeling a different kind of pinch — oversupply. Due to slight shortages earlier in the year, many OEMs have produced and supplied more chips than were required. Western system builders, flush with DRAM, have naturally scaled back orders for the rest of the year, and while manufacturers have absorbed the drop in orders by dropping production, these reduced numbers could signal a price rise by the end of the year.

MONOPOLY FEARS

But should you be worried? The simple answer is yes. Upward movements in price — especially temporary ones — aren't just a bad thing for you as the consumer. They're likely to kill off smaller manufacturers without the bankroll to absorb such rises.

The PC industry itself isn't in danger: the demand for products will always be there, whatever happens to prices. But in a worst-case scenario we could end up with an unprofitable monopoly of five companies, which would naturally be followed by further price rises.

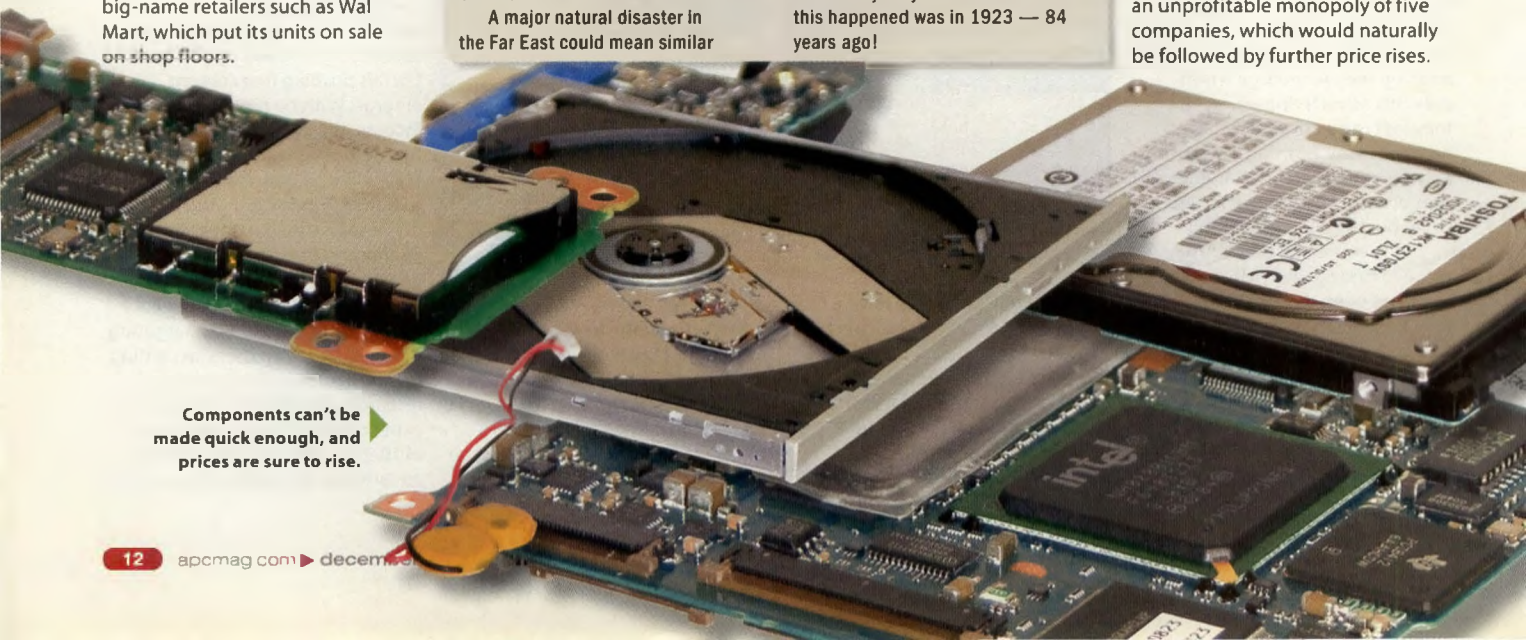
WHAT IF THERE'S AN EARTHQUAKE?

In case of natural disaster, be very afraid. The 1995 Kobe earthquake, which severely disrupted several Japanese factories, coincided with increasing demand from users upgrading their systems for Windows 95, causing a shortage of RAM that lasted nearly a year. DRAM chips quadrupled in price, jumping from \$4 to \$19 in a matter of weeks.

A major natural disaster in the Far East could mean similar

price hikes occurring all over again, and with so much technology manufacturing crammed into a small, geologically active space, it seems like it's only a matter of time. Tokyo, for example, is located near a fault line beneath the Izu peninsula, which, on average, causes a major earthquake about once every 70 years. The last time this happened was in 1923 — 84 years ago!

Components can't be made quick enough, and prices are sure to rise.



Expect the production cooler to be slightly smaller than this research rig, and users won't need to wear safety specs.



Ionic wind engines used to cool PCs

Heatsinks may shrink thanks to a new cooling technology.

As processors have become faster, they've become hotter, too. Cooling technologies have struggled to keep up with increasing power densities, and chunky heatsinks with large fans are reaching their limits. Research at Indiana's Purdue University has created an ingenious solution, by modifying the technology used in domestic air ionisers.

The problem for cooler designers is that fans and copper fins aren't just bulky, they are also inefficient. Keeping air in motion

might seem like a simple solution, but air moving over a heatsink becomes 'sticky', and an effect similar to surface tension creates a persistent barrier of hot air close to the surface of a chip. Purdue's cooler stretches a tiny high-voltage wire across the surface of a chip and places a copper electrode under it, which creates a breezy flow of ions. This breaks up the sticky air and improves the cooling effect of air from a standard fan. In tests on a prototype, cooling efficiency improved by 250 per

cent, cooling a processor from 140°C to a more temperate 95°C.

There are two problems that have to be solved before the technology is ready for market. A working cooler would need an array of engines across the surface of a chip, which is a tricky design challenge. The other challenge is creating the high-voltage power for the unit.

In spite of these problems, Purdue's design team hopes to have a working version on the market by 2010.



Want to nominate a dumbest moment in tech? Send an email with the subject line "Dumbest Moments" to dwarne@apc_magazines.com.au. All correspondence becomes the property of APC.

COPPOLA COPS IT SWEET!

He was doing the right thing, backing up his data, but he still screwed up, say security experts. Oscar-winning Francis Ford Coppola was filming in Argentina earlier this month when his studio office in Buenos Aires was broken into. The five thieves stole Coppola's computers and the backup drive to which he religiously backed up his data. In all, Coppola lost about 15 years' worth of data and memories. He said after: "They stole our computers. They got all our data, many years of work. If I could get the backup back, it would save me years [of] all the photographs of my family, all my writing."

The moral of the story is that it's not only important to back up, but to also ensure that in the event of theft or disaster, the backups are not on the same premises. Coppola did the right thing by backing up his family photographs, writings and the script of the new film he is shooting in South America, *Tetro*, which features Matt Dillon, and is about the infighting of an Italian immigrant family. But carrying the backup drive with him was a fatal mistake. Star power may yet be able to save him — he has threatened to leave Argentina if the drive is not returned.

THE (A)PC REVOLUTION

December 1985



HP VECTRA

Whenever Hewlett-Packard launches a new micro, we usually get quite excited in the APC office, because even if it isn't very interesting, we can always marvel at the way it's put together.

APPLE DISK

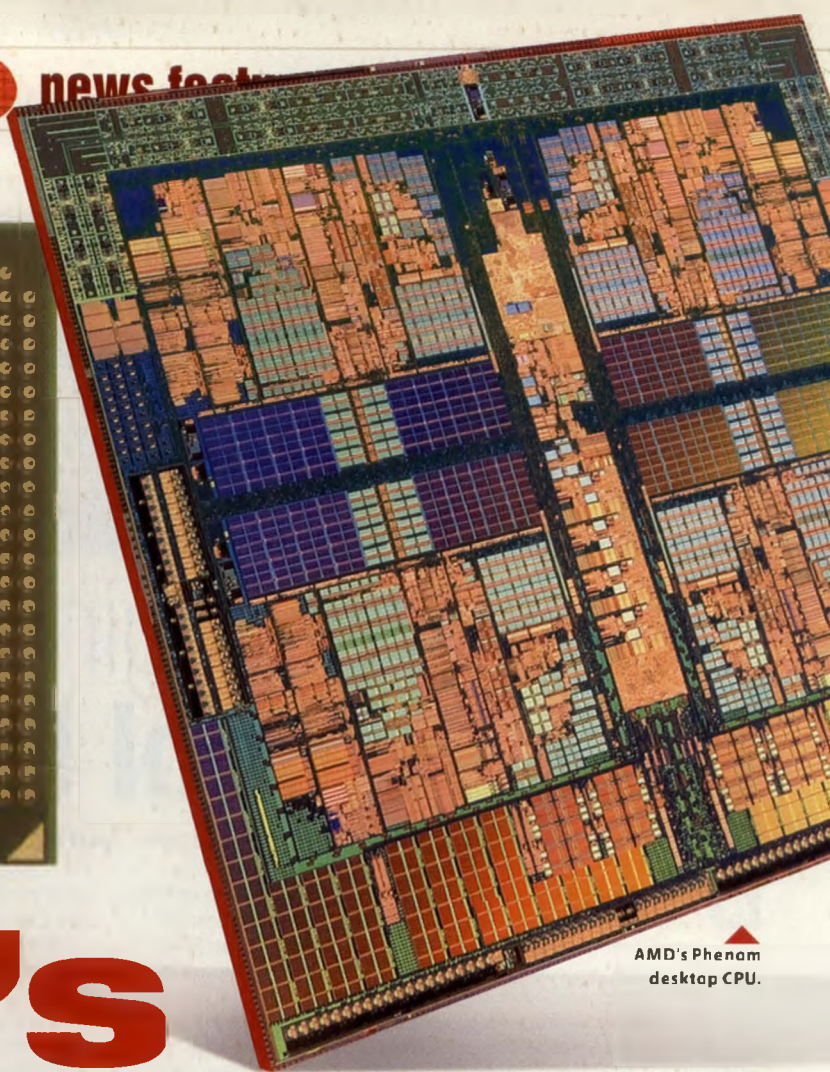
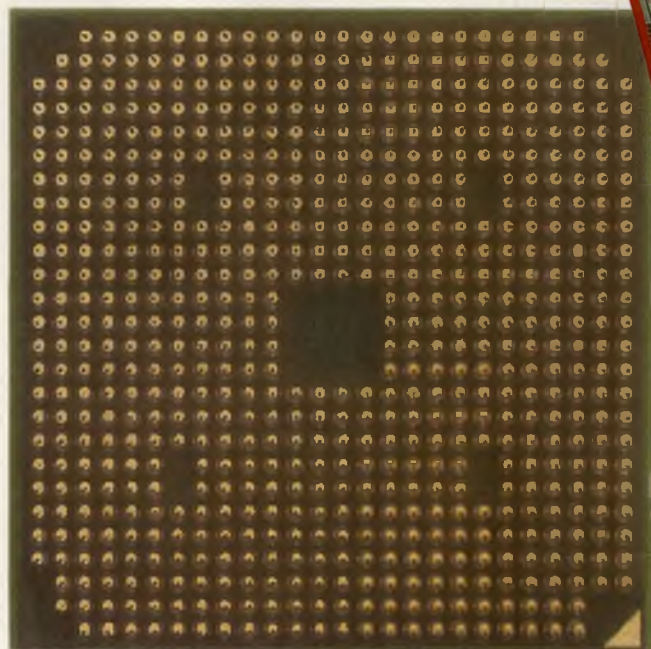
One of the criticisms most commonly levelled against the Apple Mac is its lack of high-speed, high-capacity disk storage. The Mac comes with just one 400KB floppy disk drive, and to make the machine usable, an optional external floppy drive is needed... Now finally, Apple has launched its own 20MB hard disk, to be known as the Hard Disk 20.

HOMEPAK REVIEW

Integrated software (word processor, database and communications), the like of which is common for business micros, is now available for home users in the shape of Homepak, from Batteries Included... all three programs come on one single floppy disk, and interestingly for Batteries Included, a company that normally uses dongles on all its programs, the disk is not copy-protected (apparently this was at the express wishes of the programmer).

AMSTRAD WORD

Amstrad's period of prolific manufacturing continues with the PCW 8256, a good-quality, great-value word processing system. With its new machine, Amstrad seems to have taken its good-value image to new heights — a word processor with CP/M, a disk drive, 256KB of RAM, a monitor, Basic, Logo and a printer for under \$1,500.

AMD's Phenom
desktop CPU.

AMD's Quadzilla attacks!

Intel may have got the jump on AMD with the Core architecture, but *David Flynn* reports that AMD is now hitting back with Barcelona quad-core processors.

AMD often enjoyed the edge during the era of the megahertz wars, especially when it could parlay both performance and price into a better-value package. Intel regained leadership by rapidly shifting out of the x86 world to the Core architecture and dual-core processors. Now AMD has its eyes on the prize by staking out the new performance territory of quad-core processors built around the Barcelona platform. Barcelona integrates four independent processor cores onto a single piece of silicon. This is in stark comparison to Intel's current quad-core strategy of tying together two dual-core chips, which may be less elegant but also less complex, enabling Intel to deliver its first quad-core superslabs a full year ago.

While a Barcelona-bred Opteron server will touch down in October, it's the quad-core desktop processor named Phenom (a groan-inducing shortening of 'phenomenal'), which could already be out by the time this issue hits the streets, that AMD hopes will become the game changer for the mainstream market.

Like its server sibling, Phenom will introduce a bucket of Level 3 cache to be shared among all four cores in addition to the Level 1 and Level 2 memory allocated to each core. The L3 cache will kick off at 2MB with the first Phenom CPU, codenamed 'Spider', and triple to 6MB when the second-gen 'Hardcastle' chips move from 65nm to a smaller 45nm die in the second half of 2008.

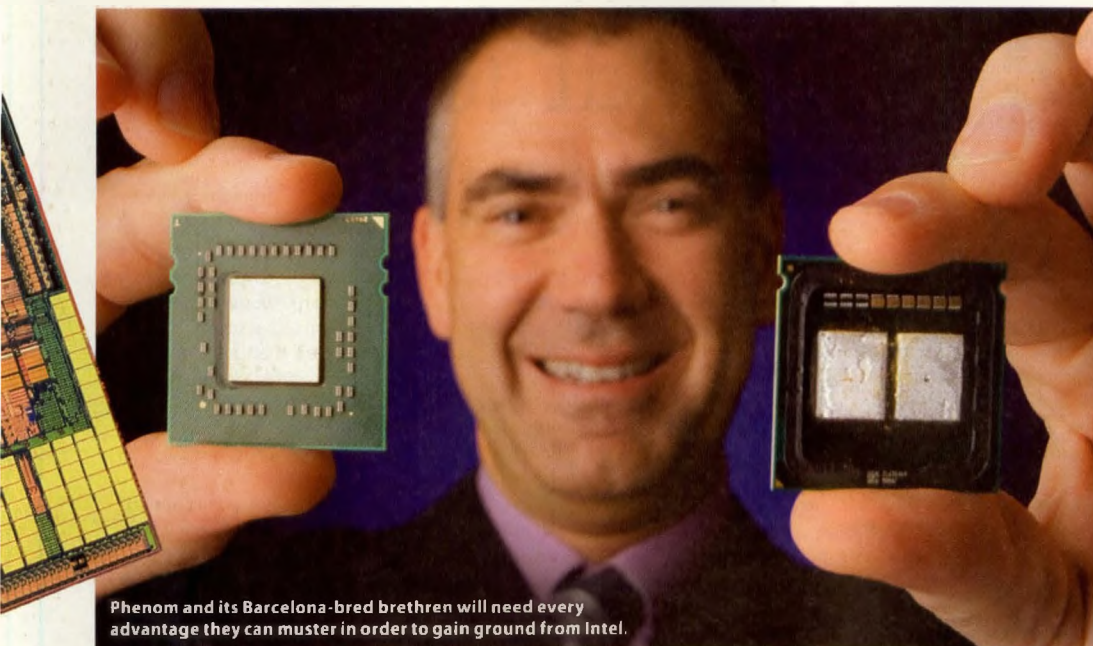
"We still have L1 and large (512KB) L2 caches that are independent for each core, so even if one core is running a command that's going to eat up all the Level 3 cache, the other cores can still remain active and access and process data," explains John Fruehe, AMD's worldwide business development manager. "When you have only two levels of cache and the L2 is shared between a pair of dual-cores, if one of the core pairs needs to take up the entire cache it effectively blocks out the other core and they're left with only a very small L1."

The L3 cache also makes for a faster and more efficient memory transport, says Fruehe. "In a multi-core scenario, the cores often need access to the same data, especially

if you have cores sharing a task, such as in a multithreaded application. If one of the cores needs data that's already been cached by the second core, it doesn't need to travel down through the frontside bus and the memory controller. Core A just grabs it straight from core B."

Fruehe also cites the benefits of Barcelona's design for virtualisation, which is becoming increasingly appealing not only to server farms but to desktop users running multiple operating systems and even bespoke gaming environments stripped back for optimum performance and hardware compatibility.

AMD already boasts an advantage in virtualisation with its integrated memory controller



Phenom and its Barcelona-bred brethren will need every advantage they can muster in order to gain ground from Intel.

OPTIONAL TRIM

As the architecture evolves, AMD hopes to avoid replacing the megahertz wars with a 'core war' arms race based on the number of cores built into each chip. "Just as frequency wasn't everything that the consumer needs, more cores isn't always everything that the consumer needs," says Chris Winiewicz, Business Development Manager for AMD's Mobile PC business. "Taking the Fusion path shows that we want to go in a different direction. If performance is what the consumer needs, maybe it's with three cores running at higher frequency as opposed to six lower-clocked cores. This is all way in the future, but maybe it's one physics core and two graphics cores on the same chip, or chips with cores optimised for specific applications. Fusion is all about that modular philosophy of designing chips to bring the best product to market for specific needs, and maybe becoming a little less general and a little more tailored."



BARCELONA INTEGRATES FOUR INDEPENDENT PROCESSOR CORES ONTO A SINGLE PIECE OF SILICON, IN CONTRAST TO INTEL'S STRATEGY

creating a fast pipeline between the processor and system memory. In Phenom, the controller will support DDR2, but it's more significant that Barcelona will allow "direct communications between the virtual machine and memory without having to go through the hypervisor" touts Fruehe. "Virtualisation is highly memory-intensive, but because the VM now has direct access to memory, this way there's less swapping and less overhead. We're seeing a 79% increase in virtualisation performance between our own dual-core and quad-core processors, even though the dual-cores had significantly faster clock speeds".

While AMD has yet to release clock speeds for Phenom, indications are these will range from 2GHz-2.4GHz per core. The processor will ship in two skews: the standard Phenom will come in both dual-core X2 and quad-core X4 flavours, while the Phenom FX will offer "ultimate performance for mega-tasking" says desktop brand manager Simon Solotko. Mega-tasking? "It's running multiple

multithreaded applications at once," he offers, and implies that the FX model will also be unlocked so as to fully satisfy the demands of the gaming and tweaking set. The Athlon X2 will move down in order to become AMD's mainstream processor.

Asked why anyone needs quad-core on their desktop, Solotko wryly replies: "Because Vista needs two cores and you need two cores". He also expects quad-core to reign supreme for "heavy-duty applications like DVD ripping, which is an amazingly popular pastime," he adds with another smile.

Phenom and its Barcelona-bred brethren will need every advantage they can muster in order to gain ground from Intel, which opted for the simpler design of pairing together two dual-cores in a single 'dual die' package. This allowed Intel to bring quad-core processors to the market in November last year, giving it a full year's head start over AMD and also leveraging the costs and efficiencies of its existing dual-core lines. Intel has already slashed prices on many of its quad-core processors, in one instance

bringing its entry-level Core 2 Quad Processor (the 2.4GHz Q6600, with an 8MB L2 cache and 1,066 MHz FSB) down to the same US\$266 price as its fastest non-Extreme Core 2 Duo desktop chip (the 3GHz E6850 with 4MB of L2 cache).

At the same time, technical glitches and gotchas in Barcelona's more complicated design have hamstrung AMD for much of this year. In an interview with *The San Jose Mercury News*, CEO Hector Ruiz said "every time we ran into a (problem) it created a six-week-or-so hole in the schedule as we went back and fixed it. We hoped we wouldn't get many of those, but in the Barcelona case, we got more than we thought. By the time we got through fixing them all, we were six months-plus later from where we originally wanted to be."

While AMD's latest roadmap takes the Phenom only to 2008's 'Hardcastle' processor, the server and workstation skew reveals Barcelona's follow-up 45nm version Shanghai due in 2008, and, in 2009, an eight-core processor built on the company's new 'Sandtiger' platform (which Fruehe revealed

would have been called 'Melbourne', in keeping with the theme to christen all server chips after cities which host the Formula 1 Grand Prix, but for AMD's decision to shift to shark-based names for the next-gen family).

But Barcelona and an ongoing cavalcade of cores aren't all that AMD sees in its future. In 2009 the company intends to unveil a new architecture, dubbed Fusion, with an integrated GPU and a modular design that can be optimised for performance, power consumption, devices and even application-specific modes. Intended to span the space from today's x86 systems such as servers through to notebooks, as well as consumer electronics and mobile devices, Fusion will offer developers a choice of cores: the performance-tuned Bulldozer (with thermal envelopes from 10W to 100W) and the CE-scale Bobcat (with power levels for 10W to under 1W). The first Fusion processor will be the Falcon family of dual-core and quad-core CPUs built around the Bulldozer core and tailored for notebooks. **ETC**



Fair use isn't that fair

Microsoft is entitled to implement means in order to protect its products, but how far is too far?

Vista's new activation model raised quite a few concerns when details were first released. The concept of 'volume activation', where every single instance of Vista has to be individually licensed, regardless of whether they've been purchased individually or through a Volume Licence agreement, painted nightmarish images of licence management for desktop admins.

Fortunately, implementation doesn't seem to have been too painful, and Microsoft has certainly provided enough tools and documentation to ease the move from XP's blanket volume licensing arrangement. The whole point of volume activation is to try and curb the widespread piracy of Windows products. Volume-licensed copies of XP and 2003 are the basis of all illegal Windows software, whether downloaded from pirate boards or sold in dodgy markets. The tough new approach for Vista was proving very successful until a loophole put in place for certain OEMs was exploited and fully functional illegal copies of Vista are now freely available (if you know where to look). So pirates are as happy as ever and the rest of us are stuck with an ultra-strict licensing model.

My own personal experience of activation has been limited (it's

something which happens to other people). I don't tend to move Windows from one machine to another and don't change hardware configuration very often.

However, I recently changed the graphics card in my main machine — which runs Vista Ultimate. The hardware swap-over went smoothly, and I didn't suspect that anything was amiss. Then, after a while I received a pop-up stating that I needed to activate Windows and had only three days to do so. Essentially, the hardware

be a 'fair usage' policy, allowing users to change mainstream components like CPU, memory or graphics card without having to re-activate? This is especially important since Vista runs much better on the latest hardware, and it's more than a little unfair for users who have bought the product in good faith to have to re-activate because they've bought new hardware for the primary purpose of improving Vista's performance.

Where could you draw the line of such a fair use policy? How far can

you allow users to go before forcing re-activation? I would argue that anything up to but not including a motherboard change should be acceptable under a standard licence — as anyone who has tried it knows, upgrading a motherboard pretty much requires a full Windows rebuild anyway.

Microsoft is perfectly entitled to protect its products, but when legitimate customers are being inconvenienced to such an extent as this, the right has been taken too far. [BITE](#)



**WHERE DO YOU DRAW THE LINE?
HOW FAR CAN YOU ALLOW USERS TO
GO BEFORE FORCING RE-ACTIVATION?**

change had de-activated Windows and I hadn't been informed. Luckily the pop-up alerted me, otherwise I would have been knocked back into RFM (Reduced Functionality Mode).

I was able to call Microsoft Support and re-activate Windows, but the fact is that, according to Microsoft's own FAQ on Vista activation, the problem should never have occurred.

That aside, Windows' intolerance of hardware changes is, I think, taking product protection a little too far. I can appreciate that users should not be able to transfer an activated version of Windows across to a second machine and use both concurrently, but surely there should

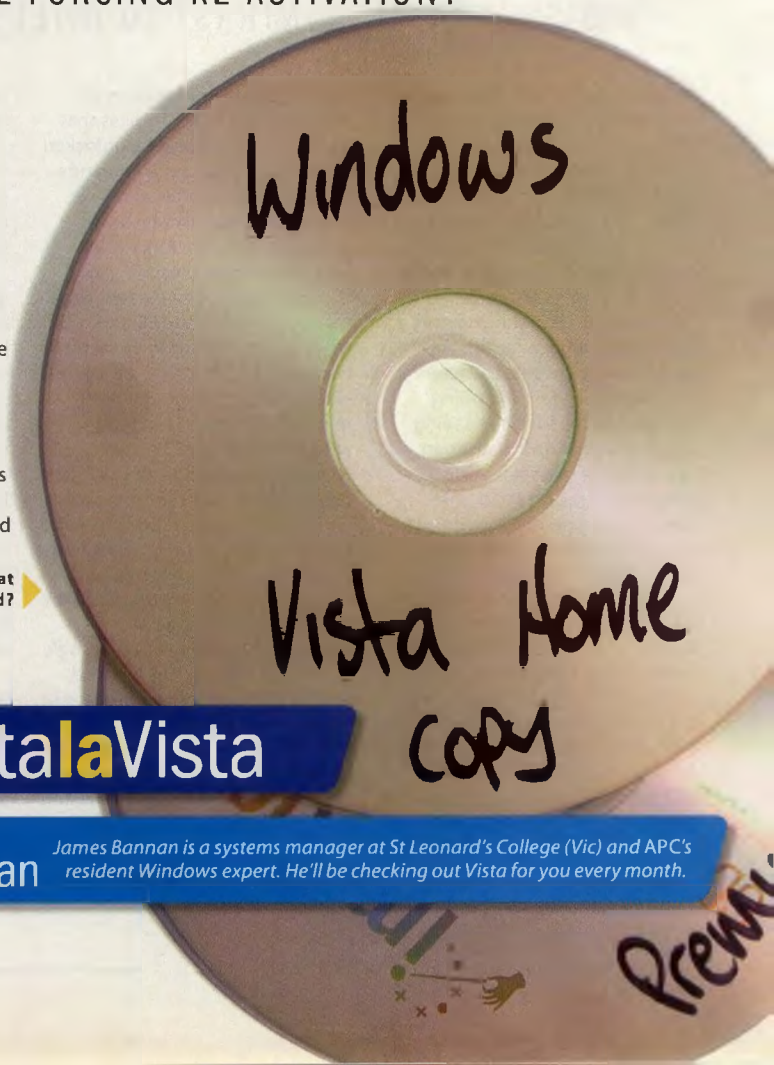
Forced re-activation: what would be a fair standard?



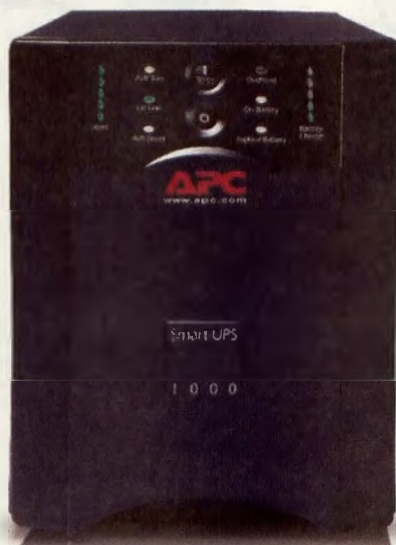
HastalaVista

by
James Bannan

James Bannan is a systems manager at St Leonard's College (Vic) and APC's resident Windows expert. He'll be checking out Vista for you every month.



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The steady march

Linux was never about beating the competition — it was about providing an alternative for (and from) its community.

Remember when Microsoft first dismissed Linux, then tried to ignore it, then called it a virus, and then decided to fight it? Red Hat, in its short clip 'Truth Happens' echoed this — and the ultimate result — with a wonderful quote from Mahatma Gandhi (search for 'truth happens' on YouTube).

This evolution of attitudes towards Linux has changed as Linux has become more and more a part of the IT landscape. And now, of course — though under duress — Microsoft is aligning itself with Linux with its deals with the likes of Novell, because every other prior strategy has failed. And despite how it's spun, the patent deals aren't about trying to work with Linux for the benefit of its customers, it's about trying to contain it.

Which, like the other strategies, won't work either.

It sounds very Borg-like, but in the end Microsoft's only option will actually be to join in, or disappear by the wayside. It's not that Windows is necessarily inferior — though I know many of you will happily argue that it is — it's more that Linux and open source represents a development philosophy that can't be competed



Truth happens: Red Hat's take on Microsoft and Linux.

against. More people have contributed to, and will continue to contribute to, Linux than Microsoft could ever hope to employ for Windows. And with people come minds, talents, ideas, skills, and most importantly passion that is rarely motivated by money. It doesn't matter if you have a workplace with swimming pools and five-star meals and massages all day (though that *would* be nice) — their's isn't a commercial development model that can compete with open source. The only action to take against it, is to join it and in turn benefit.

Microsoft hasn't quite grasped this concept yet. It's trying to, with its Microsoft Public Licence and Microsoft Reciprocal Licence that the company recently put through for approval to the Open Source Initiative and which are an improvement over the original and restrictive Microsoft Reference Licence that formed the basis of its Shared Source initiative. However, these represent avenues of future options for Microsoft, not a change in its development philosophy. And fairly, with its entire business built off the closed-source model, that's unlikely to ever change.

But, while that's the case, Microsoft will increasingly become maligned next to the open source juggernaut which steadily, and surely, continues to grow.

It's telling that Vista — Microsoft's touted latest and greatest — is a poster boy of all that's wrong with Microsoft. That's not to say there aren't benefits to it (a time and a place for everything, after all): it's just that as far as software is concerned it's rapidly becoming the outdated modus operandi, and reliance on it will equate with an inability to compete in a changing world.

And for Linux, funnily, there is no competition, not because it's better, but because it's not actually competing. Development on Linux and open source apps is frequently about the need to fill a gap, not to compete with closed source alternatives. There is some friendly competition with applications, like office suites, but for Linux itself as an operating system it was never designed to better Windows — it was just designed to work and work well, and any competition is by the wayside.

It's all too easy to toss around predictions, but open source isn't just here to stay, it's also clearly the future (and in time it, too, will eventually evolve or be replaced). Despite hanging on tight, Microsoft knows this too. **BTW**



THEIR'S ISN'T A COMMERCIAL DEVELOPMENT MODEL THAT CAN COMPETE WITH OPEN SOURCE: MICROSOFT HASN'T QUITE GRASPED THIS YET



LinuxWindow

by
Ashton Mills

Editor of the Linux Pocketbooks series, and now with CHOICE magazine, Ashton has been a tech journo for over 12 years, including five years with APC.

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Head tech not so smart

**Techies having a go at their techie bosses
— and computer practical jokes.**

A reader who will remain anonymous recalls the new CIO (of a major New Zealand company) storming into the desktop support office "complaining she had no network connection and claiming someone had taken her network cable. The tech team shook their heads, and one of us followed her back to her office.

"She pointed to the parallel port and said, 'See? The network cable is missing. I want to find out who took it and why. I will *not* have things taken from my office.' At this point, our kind desktop support guy explained the port was not a network port, but the parallel port for the printer.

"All red-faced, the CIO had another rant about the network being down. Our DT guy checked all the cables — no problems there. He pushed down on her laptop and clicked it into the docking station, and of course the network activity lights fired into life.

"Funny how far a smile, a dumb laugh and a degree will get you. I left the company not long after this."

Since we've published similar emails in the past, APC believes CIOs should be required

to pass a basic computer skills test before being appointed.

BOSS EASILY FOOLED

Piers Rowan got a call from one of the managers at work saying the "laptop was broken." Since the manager needed it on call each night, the order also came to buy a new one and to bring it to the office. When Rowan double-checked whether the managers laptop was really dead, she reassured him that it was, because "a few boyfriends had looked at it and they worked in IT and they said the screen was dead."

Fair enough, thought Rowan, and he picked up a new machine. "I arrived at her office with a new laptop in hand and just for laughs I tried to boot up the old one. It started, but the screen was black, very dark. Sensing something fishy, I turned up the contrast and the screen worked perfectly well. So she had asked me to buy a new laptop because someone was playing a joke on her and turned down the brightness — an expensive joke!"

CIOs ON THE FLOOR

Not all CIOs are dumb end users. Cameron Patterson of Clapham,

Adelaide, recalls taking a support call from a new temp girl in the finance department of his company. "She was having a few problems, so Peter, our part-time support guy who overheard the conversation, volunteered his services to pop round to see her.

"The cable had a loose wire. So in his nice three-piece suit he crawled under the desks tracing the network cable. He fetched a new cable, made sure everything was working and sat with her, explaining printers and drive letters and just making sure she was happy.

"About lunch time I turned up with instructions for the phone system and her new number ready to help set up her voicemail. But she wanted to know where the nice tech guy Peter was. I had to explain to her that, in fact, he was the CIO of the company, my boss's boss. The CIO used to do several support calls a month, even though he had an IT staff of 30. He had a master's degree and he still loved to get his hands dirty. The temp girl was impressed!"

DUMB STUDENT

Will Edgar is an in-store tech for a local computer shop in Yamba, NSW. He recalls a mature-age uni

student who stormed into his shop one day. "He had a whole stack of papers and asked me to look at his assignments to see why he kept getting them sent back. After looking at the first page it was obvious to me: he had been asked to ensure the essays were formatted with 1.5 line spacing. They were single-spaced, but he was putting in 1.5 spaces between each word. Intrigued, I asked him how he got the half space between the words. He looked at me like I was an idiot and said, 'You obviously don't know anything about Word. To get the half space you just tap the space

Head of the class: just how do some of these executive types get to the top?



EndUser

from
The readers of APC

APC readers who deal with new computer users or incompetent IT administrators share their survival stories.

WINNERS!

This month's published End User writers win a Roxio Easy Media Creator 10, Roxio's Vista-ready flagship suite of digital media applications worth \$159.95. Easy Media Creator enables you to quickly and easily produce impressive multi-media projects that combine photos, video and music. Creations can be shared and enjoyed on CD, DVD, the web or on popular portable players and mobile phones. Easy Media Creator 10 also includes Roxio MyMoments, which shows how other consumers are making the most of Roxio's rich applications.



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Send in your tales of woe involving dumb end users or incompetent techies to apcenduser@acpmagazines.com.au and if we print it, you'll win a prize. You must supply contact details in order for us to verify your contribution.

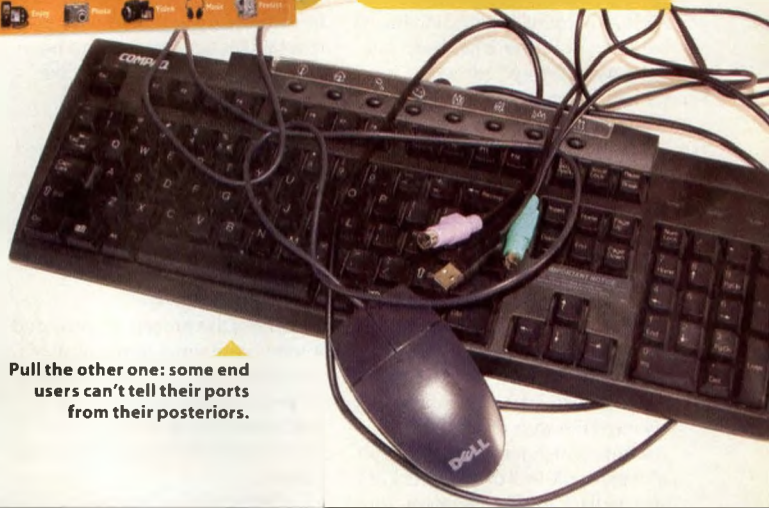
bar really quickly for the 1/2 space! I couldn't help but burst out laughing and the rest of the onlookers in the shop were nearly on the floor. After showing him what he needed to do he was very red-faced."

WRONG PORT

It's amazing how end users get their ports mixed up. Anthony Markham was at a friend's house a few months ago. "While I was there, he innocently said, 'Oh, and while you're here Anthony, can you take a look at my computer. I can't seem to figure out how to plug in my mouse.' So I went into

his study and had a look at his computer, lying on its side on the ground. I asked him to give me a demonstration of how he was trying to plug in the mouse, and so he walked over, grabbed the cord and started trying to shove it into the COM port! After some explanation, he figured out the difference between different ports being used for different things, and then I got the mouse working for him in no time at all. What worried me was later, during the evening he said, 'Hey, now you've done my mouse, you can fix up my keyboard as well!'" **ETUC**

Pull the other one: some end users can't tell their ports from their posteriors.



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Should I stay or should I go?

When ISP service isn't up to scratch, sticking around isn't an option. But what if you try to get out, and can't? Watchdog investigates.

Earlier this year I applied to activate a letsgo.com.au ADSL2+ account. What has followed has been a disaster. It has been sad to be part of an episode where it took three months to be connected, then the actual broadband service was intermittent, and then to have to deal with being on hold for long periods to a Malaysian-based helpdesk for a Perth-based company. The old adage is that 'it is too good to be true'. Well, the Lets Go ADSL2+ deal appears to be too good to be true. I can't even close my account with them. Today, I called their office — three weeks after I gave them written notice that I wanted the account closed and confirmation that they would credit all fees for the lack of fulfillment of a standard fair trade agreement. They still don't know what they are doing and have said they will call me back. After hearing this response at least a dozen times I don't hold much hope. What can be done?

Andrew Pitchford
Chief Operations Officer
United Christian
Broadcasters Australia

Watchdog contacted Lets Go's parent company, Concept Networks, and asked them to respond to Andrew's concerns.

Dear Watchdog,

The original application we received from Andrew was that he wished to retain his number and port his line over, which was not possible since his line was on the Optus cable network.

We then got Andrew connected with his new application, which was a new line [with] new copper. Some issues arose from the new copper and our supplier found some cabling problems which were then rectified.

During this process we provided Andrew with some compensation for his DSL and let him know that his phone service was covered by Customer Service Guarantee (CSG) Credits for any downtime due to faults.

Unfortunately, Andrew wasn't happy and demanded a disconnection 'with no termination

fees', which we needed to examine in detail and discuss. I hope this can be used to convey our side of this story.

Jason Calvert
Internet Services Manager
Concept Networks

Andrew confirmed that "in essence what Lets Go has said is true" but commented that it was "what they haven't said" which constituted his issue with them. Specifically, he stated: "I have not been made aware of compensation being made for this purpose and they have not answered the fact that we continued to have unusable service with the cable modem (Netgear, which was approved by them as acceptable) continually disconnecting as well as bad line noise. Lets Go did not come back to us on these issues despite weeks going by between our phone calls to them. ... In all my dealings with Lets Go on this issue they have never responded in writing (email or snail mail) on any point raised. All communication has been verbal. Sadly this saga is still going — and I believe even more goes to show how compensation is due."

Watchdog again sought a response from Lets Go, informing the company of Andrew's continued position and asking whether there were any updates to the case, specifically with regard to the contested matter of compensation.

Dear Watchdog,

Yes, we believe this to now be resolved. Andrew's connection was disconnected on 19 July. We have refunded his account to the start of July in case he feels there were any delays on discussions at our end. We have also not passed on any of the early termination charges which we have incurred. In regards to the DSL credit, this was created and emailed to Andrew on 20 May 2007. I can email this to Andrew if he didn't receive it, or alternatively send it via post.

Jason Calvert
Internet Services Manager
Concept Networks

Andrew thanked us for investigating, commenting, "I am pleased you are getting a response, but I am still dissatisfied that Lets Go has not reimbursed the other charges or communicated in any form to resolve the issue. It's amazing how powerful a phone call or letter could have been in moving this forward. A lesson for all customer service operations from this experience is that 'ignorance is not bliss' when dealing with a customer's concerns. They have chosen not to provide any 'resolution' or to communicate any possible negotiation regarding my concerns. They have voiced their concern at 'their loss' regarding early termination charges. What they lost sight of during this experience was a customer who spent hours trying to get a resolution or a reasonable service. I suspect it cost me more than Lets Go and continues to do so." When last we spoke to Andrew, he was seeking an update from the Telecommunications Industry Ombudsman in relation to the dispute.

Stuck at a consumer crossroads?
Choose your next step wisely.





FEE TO GOOD HOME

Tim Foster, Minister of the All Souls Anglican Church in Leichhardt, New South Wales, was initially excited about the prospect of upgrading to an ADSL2 plan offered by TPG in order to take advantage of the savings offered by VoIP. However, this excitement quickly turned to despair when not everything went quite as planned.

"To my surprise it worked perfectly, for about 60 seconds. Since then it has worked only intermittently, despite over 15 calls to technical support and driving to North Ryde to replace the modem. After many hours and five months trying to solve the problem, I decided to cancel the contract."

Tim was told TPG had "no choice" but to charge a \$350 fee. He explained how, under the contract, TPG could

waive this penalty if they'd been given "ample opportunity to resolve the problem", but TPG disagreed they had.

"I even offered to cut my losses (of over \$500), but will not pay them another \$350. I can't believe how unreasonable they are."

Watchdog referred Tim's concerns to TPG and received the following response from Vitek Piestrzynski, internet division manager: "I sincerely apologise for inconvenience caused to Mr Foster. I can assure you that TPG strives to provide the best possible service to all customers and appreciates your feedback. After reviewing Mr Foster's case, I have decided to release him from his contract and terminate the service without penalty. I have agreed to give

Mr Foster a full refund [on modem equipment]. Many factors, like distance from the exchange, internal wiring, quality of copper and EMI, outside TPG's control, contribute to a customer's service quality. We appreciate our customers' feedback and your contribution to help in service improvement." Tim was thankful for the resolution but commented that if, as Mr Piestrzynski said, so many factors can impact upon service quality, then TPG needs "to have a much better system for reviewing customer requests to terminate (without penalty) under these circumstances. . . Their failure to provide this means customers are either forced to pay the fee or to take the matter to the Telecommunications Ombudsman or media."

COVER STORY

I purchased a Fujitsu T4215 Tablet PC earlier this year, having heard good reports about Fujitsu's quality of service. Approximately two weeks later, a vertical line developed in the plastic cover over the screen — not the LCD screen, but a thin plastic cover that is installed over it. At first, this was a just a thin line that I photographed, but, over time, it has worsened.

Upon taking it to Fujitsu's Homebush service centre, I was told instantly by the technician that no screen issues were looked at. Even after telling him that it wasn't the LCD but the removable plastic in front, he still told me it probably wouldn't be looked at, claiming there was no way to prove that the damage wasn't caused by the customer. While I was there, he peeled back the plastic contact that Fujitsu has on top of the thin plastic to check underneath, and, apart from the line, the plastic seemed

fine, and the LCD itself was also fine — certainly, if I had smashed the screen, I'm sure the LCD would have suffered at least some damage.

The technician I originally spoke to was actually quite friendly and said it was just company policy — the screen layer itself apparently costs \$30, but labour would be over \$100, my warranty not covering it. The screen-layer issue has actually gotten worse, and my hope would be for Fujitsu to at least acknowledge it and repair/replace the screen.

Victor Hooi
Baulkham Hills, NSW

Watchdog referred Victor's complaint to Fujitsu PC Australia and received the following response.

Dear Watchdog,
All of our products undergo rigorous and stringent testing according to the Qfinity management philosophy of quality

control. The LifeBook T4215 uses a tough LCD front cover panel that is strong and durable enough to withstand damage under normal usage. This is further demonstrated by the laptop being a touchscreen with a digitiser pen so users can hand-write directly on the screen without damaging it.

Fujitsu PC's service centre engineers diagnosed that the LCD front cover panel from Victor's notebook has been damaged only through abnormal physical impact. It would be best described as a crack on the LCD front cover panel — a crack so large that it would be impossible to appear without abnormal physical impact. Physical damage that is not at fault by our company is excluded from our after-sales warranty terms and conditions. Accordingly, we regret that we have to charge for the repair cost to Victor.

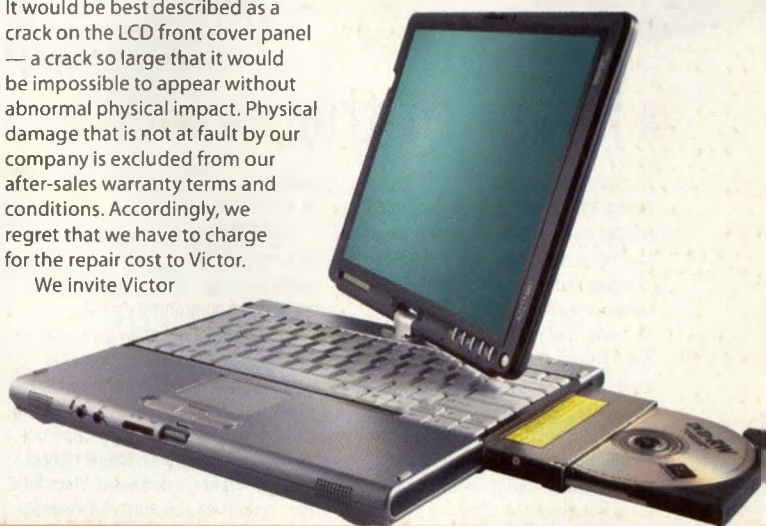
We invite Victor

to visit us at our service centre so we can personally provide further assistance or we can arrange a courier pick up and return of his laptop as part of the warranty procedure. If Victor finds it inconvenient to part with his laptop, we can also provide him with a loan unit again free of charge while his laptop is being repaired.

Howard Wong
Customer Service Manager
Fujitsu PC Australia



MY HOPE WOULD BE FOR
FUJITSU TO AT LEAST
ACKNOWLEDGE IT



watchdog@acpmagazines.com.au

Has an IT vendor or telco stuffed you around? Let us know about it and we'll chase them for a solution on your behalf. Letters sent to watchdog@acpmagazines.com.au must include the writer's full name, street address, suburb, state and phone number to be considered for print publication (please also include details such as invoice numbers and people you've spoken to). Address and phone details will not be published. All correspondence becomes the property of APC and is subject to editing.



Blu-ray vs HD DVD: combine them, stupid!

With all the consumer confusion over next-gen optical formats, one reader chimes in with a simple suggestion...

Regarding the HD DVD vs Blu-ray battle, does it occur to the manufacturers that agreement on one system would significantly hasten the uptake of HDTV players and recorders and that no-one would be a loser?

**Ken Needs
St Ives, NSW**

L COMPUTER

With regards to Gordon Drennan's letter in last month's issue (about the L-shaped computer), there is one. It's made by Australian company Ipex and it's called the AllStation X. The only thing is that the keyboard and mouse are separate from the unit, but two out of three ain't bad! It's here, at this site: <http://tinyurl.com/2me9gz>. At some stage, HP and Dell both did similar offerings, with the system mounted on the back of the monitor.

**Douglas Carrison
Mount Gambier, SA**

MY I(PODS) DECEIVE ME

Buying off eBay may seem safe, particularly when the seller has an outstanding reputation and plenty of positive feedback. Everyone enjoys a bargain, and many people will find a \$50 (delivered) 8GB MP4 player very attractive. After receiving the item in the mail, I didn't notice anything wrong until I started to copy music onto my new '8GB' MP4. Right-clicking the drive properties showed that the drive had 8GB memory; however, after I started transferring files I found that the files became corrupt after loading more than 1GB. I googled this problem and quickly found out why my MP4 was crashing and rebooting whenever there was more than 1GB of files. Apparently this was a new form of memory fraud where the seller hacks the drive so that it displays more memory than it actually has, so mine was really a 1GB player.

This is a big problem on eBay, as it is flooded with iPod look-alikes for a fraction of the price of the real thing. There is no way to tell which one isn't hacked — most people get the player, plug it into a computer and see that it has the 'right' space. They give positive feedback thinking everything is OK.

With these dodgy MP4 players being snapped up around the globe, I'm sure many people would have encountered the same problem but are unaware of what they can do. This is because sending the product back would cost almost the price of the product, and there is no guarantee that the return product will be any different. I just hope that eBay looks into this. To everyone considering buying something that 'looks too good to be true', remember *caveat emptor* — buyer beware.

**Jacky Murong
Kellyville, NSW**

letter of the month

MULTIPLE OSs

Whilst I appreciate that one's choice of OS can be both subjective and emotive, I am often amazed at the outrageous slanging matches that take place between the Windows, Linux and OS X camps, and even between the Vista and XP fans. The perfect solution to what OS to use is based on the fact that different desktop operating systems are fundamentally better at different things: the key is in your choice of hardware and the use of virtualisation.

By day I run the Windows infrastructure for a well-known company, and come from a background of Windows (and previously Netware) network design. By night I dabble in electronic music production and digital photography. I am also passionate about IT security in its many and varied

forms. As such, my choice of hardware is a 17in MacBook Pro.

On this fantastic piece of kit I run OS X for general personal activities (mail, browsing, IM etc.), my photography and my music requirements. I run Vista Ultimate in a Boot Camp partition when I'm working from home on anything that really requires a specific Windows app (Visio being a typical case in point), as well as using it as a Media Center extender from my dedicated Vista MCE box. Vista runs absolutely seamlessly on the MacBook, no doubt due to Apple's tight control over the hardware. I have a heavily secured XP-based VMware Fusion virtual machine chock full of tools for administering my work network, so my MacBook is never logged in to the network with an admin

account, and I run various Linux distros and appliances as VMs for my security work.

If you want the best of all worlds, dig deep and buy a top-notch, brand-name machine and some good virtualisation software, and leave the rest to fight it out while you sit on the sidelines looking smug.

**Shan Lee
Eight Mile Plains, Qld**

Shan wins this issue's Letter of the Month prize, a Logitech Cordless Desktop MX 3200 Laser keyboard and mouse set valued at \$199.95.





GOODBYE COMPUERVE

I just wish to say goodbye to an old friend. AOL in their wisdom decided to shut down the CompuServe Pacific network on Friday 31 August 2007 at midnight. The rest of the CompuServe worldwide network will be shut down soon after. When I joined CompuServe I was heading overseas on an around-the-world trip. CompuServe was able to provide local phone numbers for connecting in most cities and countries, including Africa. Using their proprietary email software, I've never had a virus (except within the odd Microsoft attachment) and the system worked well. So now after nearly ten years of one continuous point of contact, wherever I was in the world, I now have a new email address. To the CompuServe support staff who have helped set up numerous different modems for me for many different notebooks over the years — thank you!

**Steven A. Cooper
Burwood, Vic**

GREENFLOP PC

Sure I would like to have a petaflop computer in my lounge room (APC October, page 11), but I guess power would be a slight problem. Based on the article's calculations that 8.64MW of power is enough to power a town of 10,000 people (around 4,500 homes) my home would only have a power supply of less than 2kW. Not only is that not enough to power my petaflop PC, it doesn't make sense. The problem is that when it comes to energy consumption, an average

◀ **CompuServe: one reader farewells and thanks a departing (and handy) service.**

is not realistic. Most homes require at least 4-5kW (add hot water, heating/cooling plus a few appliances). Unfortunately, most greenie groups make the same error. For example, they will announce a new 1MW wind turbine that will supply power for 500 homes and forget that not only do you need to cater for peak power but also energy over time. Thanks for a great magazine, I am sure we all make mistakes sometimes.

**Ken Hungerford
Belmont North, NSW**

VISTA MATURING

In the last couple of months I've noticed a lot of people writing in to complain about Vista, saying things like it sacrifices functionality for security, it can't run certain programs etc. I wish to disagree. Every program I have, from iTunes to Command & Conquer 3, runs perfectly on it.

One letter I noticed in the August issue, 'Is Microsoft Kidding?', said that lots of functionality has been stripped away in the name of security. I find that Vista can actually run some of my basic programs — such as Office faster than under XP. The letter writer says there's eye candy over the same old stuff. Yes, the OS is pretty, but there are

several new features (Superfetch, CardSpace, Easyboost) that simply make applications and general computing better. He also says Microsoft have forgotten innovation and originality — sure, everything's based on earlier OSs, but the improved Windows Explorer, Control Panel and Start Menu are original enough. I also noticed another writer, 'Look Before You Leap', said the high-end, big-ticket apps don't work on Vista. This should be expected — these programs were specifically designed to suit XP and run well under it! I say to those sceptics out there, don't write Vista off. Give it a fair chance before saying it's rubbish. Not all things will run under it, but did everything that Windows 98 supported run under XP? No. Give it some time and it'll mature into something brilliant.

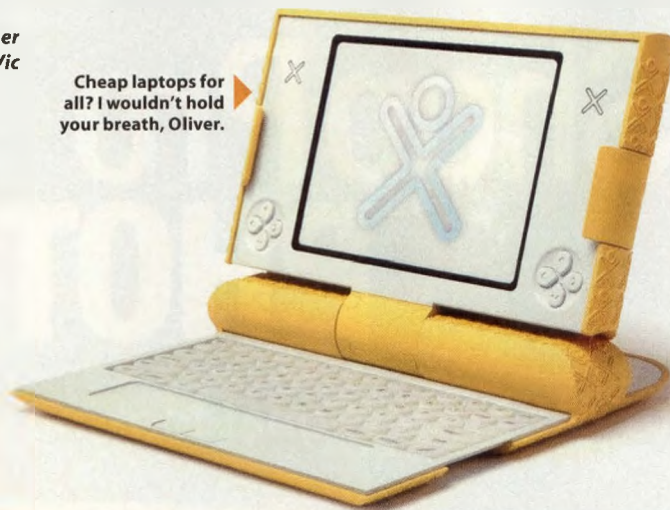
**Benjamin Szabadics
Dardanup, WA**

THE \$100 COMPUTER

About the US\$100 laptop computer. Why can't they offer these laptops to all of us? Then all kids could afford to take a laptop to school. It does show companies can build much cheaper options that can take the hard knocks. What do you reckon?

**Oliver Petersen
Mercedes College, SA**

▶ **Cheap laptops for all? I wouldn't hold your breath, Oliver.**



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Editor Tony Samo tsamo@acpmagazines.com.au
Deputy Editor William Maher wmaher@acpmagazines.com.au
Web Editor Dan Wenne dwarne@acpmagazines.com.au
Technical Editor Nick Race nrace@acpmagazines.com.au
Watchdog/Chip Chat Editor Peter Dockrill pdockrill@acpmagazines.com.au
Contributors Tim Anderson, James Bannan, Orestis Bastounis, Mike Bedford, Joe Cassels, Richard Cobbett, Troy Coleman, Alan Dexter, Justin Dike, James Ellerbeck, David Flynn, Danny Gorog, Jim Haywood, Karl Hodge, Angus Kidman, Jeremy Laird, Ashton Mills, Jenneth Grantia, Ben Sillis, Jarrod Spiga, Adam Turner
Editorial & Marketing Coordinator Helen Chen hchen@acpmagazines.com.au

DESIGN

Art Director Chris Zammit
Deputy Art Director Tim Phillipson
Photography Chris Zammit, iStockphoto

PRODUCTION

Chief Sub-Editor Melanie Fan
Sub-Editor Peter Dockrill
Production Controller Edwina Kerrigan

MULTIMEDIA

DVD Editor Lachlan Grant

ADVERTISING

Senior Account Manager Fleur Porter
fporter@acpmagazines.com.au (02) 9288 9147
Account Manager Steven Koutsoukos
skoutsoukos@acpmagazines.com.au (02) 8268 4662
Account Enquiries Vic Peter Flanagan (03) 9822 5188
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MARKETING

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CONTACTING US

Email apc@acpmagazines.com.au Web www.apcmag.com
Phone (02) 9288 9111 Fax (02) 9267 4909
Postal PO Box 4088, Sydney NSW 2001
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SYNDICATION ENQUIRIES

London John Slater
Phone 44 20 7812 6527 email jslater@acpuk.com
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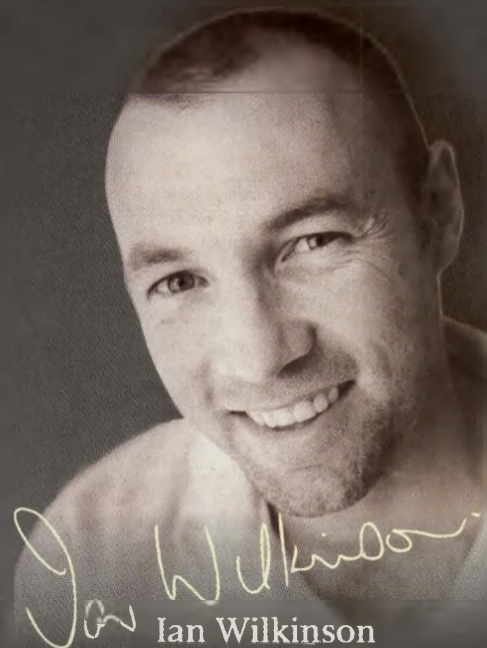
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This month in Labs... The big shrink

Recently there's been more and more talk about what goes on in the process of manufacturing CPUs and GPUs. No, I'm not talking about which bunny-suited individual carried which bucket of photolithography lubricant from machine A to machine B but, rather, how the size of the internal workings of a chip has become a topic of conversation.

With Intel's upcoming 45nm parts and AMD's upcoming 65nm Phenom processors, it's become a new arms race — but one that is less obvious than cores and GHz. There are a number of reasons to shrink the process, and not all of them have to do with the bottom dollar.

The primary reason that does make CPUs cheaper is simply space.

The wafer of silicon you're working with has a certain surface area, if you shrink your CPU to take up less of that surface per core then you can get more chips off a single wafer. This can drop the price considerably and is a primary factor in the low CPU prices we see today. Hand in hand with that, CPU prices have also dropped as a consequence of the silicon crystals being grown larger and larger. 300mm-diameter wafers are the norm around Intel's newer fabrication plants. The benefit here is that you can make more CPUs in one go.

Less obvious, but more important to the boffins with the soldering irons, is the physics of shrinking a process. When you can make your transistors

smaller they can switch faster, and smaller internal connections have less inherent capacitance (less resistance), so there's less energy lost to heat.

The materials you use to create a CPU have a big impact on its heat and performance as well. AMD chips use 'silicon on insulator' (SOI) wafers, which consist of alternate layers of silicon and silicon dioxide, which cuts down on the capacitance and reduces heat and power requirements. Intel use traditional 'complementary metal-oxide semiconductor' (CMOS) but have been continually refining the process. The latest incarnation uses strained silicon — which pulls the silicon when it's being manufactured to change the

internal alignment of the molecules, in order to allow electrons to move more easily through it.

So what does this mean? When we talk about the size of the CPU's process (130nm, 65nm or 45nm) it's a shortcut reference to how efficient, cool and (theoretically) less expensive it may be. **APC**



MORE IMPORTANT TO THE BOFFINS WITH THE SOLDERING IRONS, IS THE PHYSICS OF SHRINKING A PROCESS

NICK RACE – TECHNICAL EDITOR



**MEMORY CHOICES**

Foxconn is giving PC builders the option to install either DDR2 or DDR3 memory on its new P35AP-S motherboard, which is based on the Intel P35 chipset. US\$185 (Local prices to be announced).

www.foxconn.com

**GAME AND WATCH**

Now here's a notebook that does it all – gaming, work, and it's portable (just). Sure the price is steep, but with the Fujitsu N6460 you're getting a load of grunt including Core 2 Duo 2.4GHz, 2GB RAM and ATI Mobility Radeon HD 2600 graphics. You also get Blu-Ray and a whopping 500GB disk storage. Price: \$5,299.

www.lifefbook.com.au

**HP'S MONSTER**

We've seen some big notebooks, but the HP Pavilion HDX Entertainment is a record breaker, tipping the scales at 7.4kg. A portable it ain't, but that's ok when you're basking in the glory of a 20.1 inch screen with 20W integrated audio. If you want a notebook for DVDs then this is the ultimate. Price: \$5,999.

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Intel Harpertown Xeon X5472

45nm, 1,600MHz front side bus, SSE4 and a load of power.

We've been talking about Intel's switch to 45nm process technology and the Penryn processors for a long time here at APC. After all those words, we finally have them in hand. The replacement (quite soon, I must add) for the Clovertown Xeon processors (which impressed us in APC June, page 32) is the new Harpertown Xeon processors, and there's plenty going on under the hood.

After taking delivery of an ominously heavy box from the lads at Intel Oregon consisting of a Stoakley platform server made by Supermicro. This server contains two Harpertown processors, now officially named X5472, running at 3.0GHz, 8 x 2GB of Nanya-branded FB-DIMMs at 800MHz for a total of 16GB, twin Seagate Cheetah 15K RPM SAS drives with an Adaptec 3805 Unified controller.

STOAKLEY AND SEABURG

Stoakley is the platform that's going to be invading DP servers and workstations in the next few months as availability of the Harpertown Xeons ramps up. Stoakley consists of Seaburg, Intel's new MCH (northbridge), and the older Intel 6321 ESB ICH (southbridge). Seaburg adds memory bandwidth to the platform over Bensley with 1,600MHz frontside bus support to each CPU socket and an 800MHz FB-DIMM speed jump to match.

It's not a one-trick pony, though; Seaburg adds more PCI Express 2.0 lanes and a 24MB 96-way associative snoop filter, which handles coherency between the cache on

each pair of cores. This reduces the load on the front side bus, as the snoop filter removes the traffic from the FSB as the CPUs check each other's cache for coherency. Less overhead on the FSB means more effective memory bandwidth usage and a faster system overall.

HARPERTOWN

Harpertown is the jewel in this new platform. It's the 45nm processor out of Intel in the Penryn family. This represents the last die shrink we'll see before a microarchitecture revamp in two years (Nehalem). Moving to 45nm allows Intel to reduce power consumption and theoretically get more chips per wafer. Harpertown is also the poster-child for Intel's new manufacturing process using high-K dielectrics and metal gates. This reduces power leakage and consumption, increasing the speed of the transistor switching.

The Harpertown processors include 12MB of L2 cache (6MB per pair). The cache is mirrored in the Seaburg snoop filter, allowing a reduction in traffic across the FSB.

Another big step is the introduction of new SSE instructions, bringing the version up to SSE4. SSE4 includes 47 new instructions, improving performance for "graphics, video encoding and processing, 3-D imaging and gaming", according to Intel's white paper.

PERFORMANCE

It's all well and good to know the specs of a new processor, but sitting

down with a server is the only way you can judge if there is really an improvement. We spent many hours poring over our Harpertown/Stoakley test setup, running environments of Windows 2003 Server, Vista Business and Longhorn betas — 64-bit versions, naturally.

We tested the platform using some old, faithful (and some newer) benchmarks. We included runs of Cinebench, Linpack (for Windows, Intel-optimised), Monte Carlo calculations using SunGard Adaptive Analytics software and synthetic benchmarks for stressing memory bandwidth with SiSoft Sandra. Though our test server arrived too late to put it side by side with the Barcelona test machine, we've run most of the same tests to give you an idea on how well it stacks up against AMD's newest and Intel's Clovertown Xeons.

Sandra's Dhrystone arithmetic test clocked 110,876MIPS, beating out the previous-generation Clovertown by over 30,000. FPU results were almost doubled, earning 80,725 to Clovertown's 48,200MIPS. SSE testing in Sandra did more than double the result, earning 794,944inst/s, while cache latency dropped from 7ns for 64k and 8ns for 256k down to 5.1 and 5.7ns, showing off the speed of the Seaburg chipset. Cinebench shows just how much Harpertown reigns over the last generation. Cinebench 10 rendering saw a single core render the test image in four minutes, one second, while all eight cores got it down to 40 seconds.

Nick Race

Mac OS X Leopard

APC installed Apple's newest OS X on a MacBook Pro as soon as the OS became available — here are our impressions.

Leopard, or OS X 10.5, is Apple's fifth major release of OS X, and while not revolutionary like the first release was a little over five years ago, it's still a major achievement. Leopard continues the OS X story, adding over three hundred new features and refining some existing ones. From a user perspective, there is something for everybody.

As with all OS X installs, you have two installation options. The first is an upgrade, and this is the default option. The second option, called 'Archive and Install', lets you install a brand-new, clean system folder and copies across existing user data. In my experience the second option is always best when installing a new OS, as you'll get a chance to 'start fresh'. If you do select the upgrade option, it should proceed smoothly. If early reports are to be trusted, the only customers who have reported upgrade problems are those that use a Logitech mouse. According to various reports, Logitech's software installs a system extension called Application Enhancer (APE) that doesn't play nicely with Leopard. All versions of APE preceding version 2.0.2 are incompatible with Leopard, and will leave your system unusable if you upgrade, so beware.

When Leopard boots, the first changes you'll observe are the 3D dock and the semi-transparent menu-bar. When you open a Finder window you'll notice the icons are different, the side bar has been organised like iTunes and there is a



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✓ Plenty of new and improved features.
• VERDICT ★★★★★
✗ Great, but not exactly revolutionary.

new view called Cover Flow that lets you browse your icons visually. There's also a new button in the Finder window toolbar called Quick View (which has an extensible architecture) that lets you easily preview most document formats.

A new feature called Spaces lets you create and use different work areas for a better and more-efficient workflow with less window clutter.

Time Machine, or backup for dummies, is wonderfully simple to use. It pops up when it recognises an external drive and asks if you want to set it up for Backup, and will keep hourly backups for the last 24-hours, daily backups for the past month and weekly backups until your disk gets full.

Other programs that have a had a substantial makeover include Mail and iCal, both of which now work and look much better. Mail, for example, now supports Notes, To-Dos and RSS feeds, and has built-in HTML stationary. I know, boring for power users, but pretty cool for everybody else.

Otherwise, Leopard is a must-have upgrade. Not because there is anything wrong with Tiger, but because the incremental improvements that Leopard provides are certainly worth more than the sum of its parts. And there's nothing like spending \$158 on an upgrade and feeling like you've just bought a new computer.

Danny Gorog

BELKIN'S NEW USB HUBS

When too many USB ports aren't enough, Belkin comes to the rescue with its new port hubs. The Swivel Hub (\$59.95) rotates to provide easy port access for plugging in your devices. The Clip-On Hub (\$59.95) attaches to the edge of a desk or to a bundle of cords to keep your desk clutter-free. And the Hub-To-Go (\$89.95) is a detachable 4-port Hub you can take on the road with you.

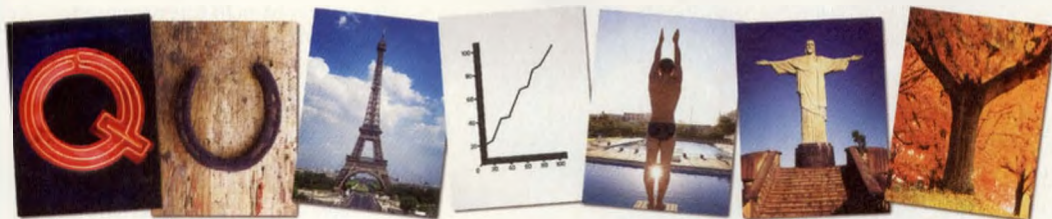
www.belkin.com/au/



LEXMARK WIRELESS

Features available in consumer-level MFPs are getting ridiculous. HP was first with a basic MFP for \$89, and now Lexmark has released the X6570, a small biz MFP with wireless connectivity, two-sided printing, fax, a 25-page automatic document feeder and photo printing. At \$299 it's cheaper than what we paid for a single-function inkjet two years ago.

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AMD vs Intel: ultimate quad-cores

AMD's third-gen Opteron brings a laudable focus on power-saving. But how does it stack up in a quad-core performance contest with Intel's best low-power Xeon?

AMD has finally released its much-anticipated quad-core processor, putting it on level terms with Intel by measure of processor cores per CPU socket — now the competition between the two is starting to look interesting.

AMD has chosen to launch its new quad-core CPU architecture, codenamed Barcelona, initially as a server and workstation chip. As such, it becomes the third-generation Opteron processor. Nine new models of Opterons make up the launch line-up, available in both two- and four-socket trim.

In AMD parlance, that's the 2300 and 8300 series, respectively, where the second digit indicates third-gen Opteron technology. Single-socket Opteron SKUs, as well as desktop chips under the new Phenom brand, will be released towards the end of 2007 and the start of

2008; these will be based on the same Barcelona architecture.

For our crucial first look at this all-new quad-core chip, AMD has supplied us with a pair of Opteron 2347 processors that weigh in at 1.9GHz, the second-highest speed grade. If that clock speed seems unimpressive, it's important to stress that these are chips with a very particular remit. High-density data house and enterprise workloads are what it's all about for these two-way-compatible processors. The emphasis is performance per watt, power efficiency and multi-socket scaling.

AMD's aim for Barcelona wasn't just extra oomph but doubling the

number of cores per socket and increasing per-core instructions per clock, all the while keeping power consumption capped at the same level as its existing dual-core chips. In keeping with AMD tradition, these new chips are backwards-compatible with existing Socket F platforms. Only a BIOS upgrade is needed to achieve a pretty much painless quad-core upgrade. That's both an attractive and cost-effective proposition, and it revs up the competition with Intel.

So, it's in that precise context which the 1.9GHz operating frequency of the Opteron 2347 (and the 2.0GHz clockspeed of the top 2350 chip) should be viewed. Of course, the question remains how rapidly AMD will be able to crank up the clocks for desktop/workstation apps that demand maximum per-socket grunt. It's also worth noting that when AMD originally began discussing its plans for Barcelona late last year,

operating frequencies in the 2.2-2.8GHz range were mooted. We've little doubt AMD would have preferred to have also released higher-clocking variants of Barcelona at launch.

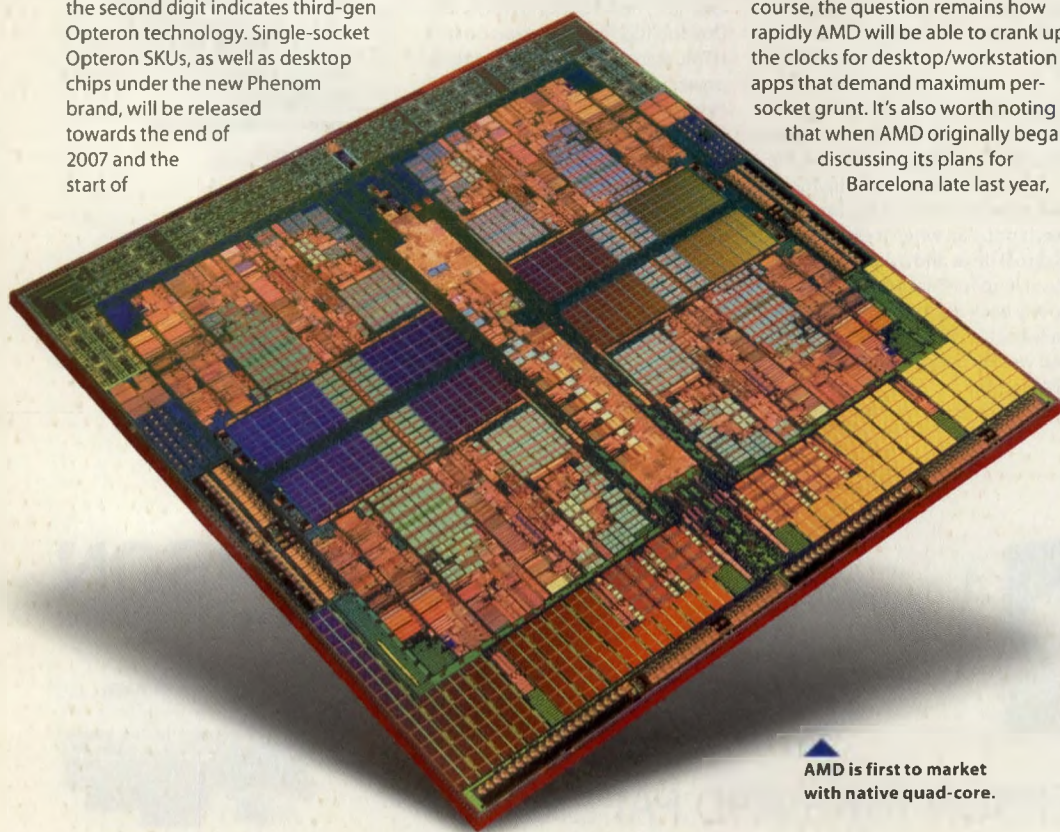
Process variation and power leakage are among the alleged culprits explaining the somewhat underwhelming launch clocks. There are also whispers of path-tuning issues requiring a new mask revision to sort. For the record, 2.5GHz Opteron 'SE' chips have been slated for before end of year. We'll be watching carefully to see if AMD hits that target and how fast those first Phenom desktop CPUs eventually clock. With Intel prepping to launch its new 45nm Core 2 and Xeon processors, the pressure is on.

NEW ARCHITECTURE

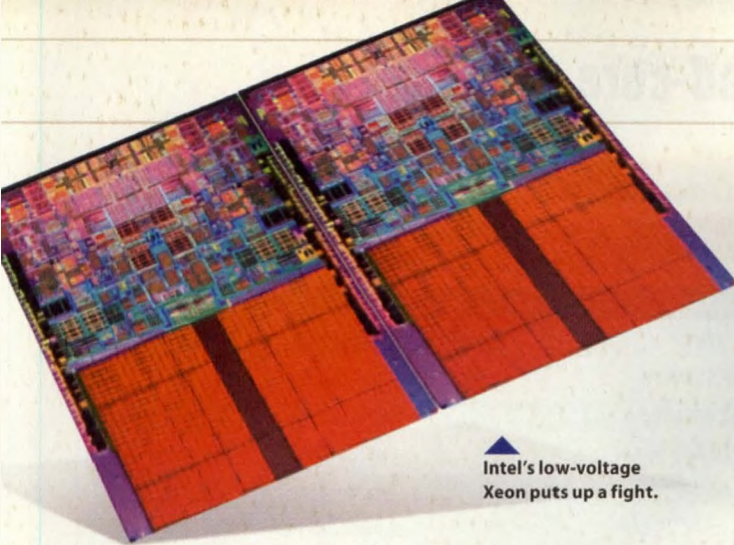
Barcelona includes four execution cores crammed into a single 65nm silicon-on-insulator CPU die and a grand total of 463 million transistors. Significantly, Barcelona is very much a major revision of AMD's existing K8 microarchitecture, as launched in September 2003. It has the same basic 12-stage pipeline and three-wide instruction issue, execute and retire design.

Much about Barcelona is familiar, but AMD has enhanced almost every part of the chip. AMD claims the performance per clock of each standalone core is up, along with improved multi-core performance scaling and optimal power efficiency. It's a comprehensive evolution rather than ground-breaking revolution.

The most obvious upgrade is the addition of two more execution cores. But this isn't any old quad-core chip. As AMD would have it, it's the first native quad-core PC processor. Unlike Intel's quad-core



AMD is first to market with native quad-core.



Intel's low-voltage Xeon puts up a fight.

CPUs, in other words, AMD's quad is based on a single slice of silicon, not a pair of dual-core dies.

This aspect, on paper, is clearly superior to Intel's Xeon. Instead of dual CPU dies sharing a single bus and off-chip memory controller, Barcelona boasts on-chip high-bandwidth HyperTransport system I/O and an integrated memory controller; not a new approach for AMD, but as PC technology makes the move to massively multi-core architectures, the resulting bandwidth and latency advantages will become more important.

In fact, AMD's logic in this regard is so faultless that Intel's announced that it plans to adopt a similar approach. Intel's next major micro-architecture revision, known as Nehalem (due late 2008), will sport QuickPath, a CPU interconnect that smells an awful lot like AMD's Direct Connect architecture, along with an integrated memory controller.

Quad-core aside, Barcelona also brings detailed enhancements that broadly fall into four categories: the execution core, memory management and on-chip communications, power efficiency and virtualisation. Key upgrades for Barcelona's execution core include wider 32-bit instruction fetch and a new 512-entry indirect branch predictor. What's more, Barcelona now brings prefetched data directly into the L1 cache. AMD has also paid particular attention to floating point performance. The latest Opteron now packs full 128-bit SSE instruction execution. Outgoing Opteron processors must break 128-bit instructions down to 64-bit pairs. All of these measures are designed to improve Barcelona's ability to munch through more instructions each and every clock cycle.

The chip's new 128-bit memory controller can now be addressed as a pair of 64-bit controllers, allowing

for simultaneous read/writes. Larger memory buffers and reduced read-write transition times have increased the controller's max. clockspeed to 1.8GHz (the latter requires a new motherboard platform with split-power planes). The new Opteron supports DDR2 memory up to 667MHz and a refreshed model, known as Shanghai, will deliver DDR3 compliance in 2008.



AMD SAYS BARCELONA IS THE FIRST NATIVE QUAD-CORE PC PROCESSOR

Barcelona's HyperTransport system I/O links have also been fettled. Firstly, another lane has been added for a total of four. Each link has further been upgraded to HyperTransport 3.0 specification. As well as increased bandwidth and reduced latency, HT3.0 also allows

power-friendly link width and frequency modulation capabilities. But there's a catch; to deliver initial backwards socket compatibility, none of these new features is exposed in the first third-gen Opterons. As with existing second-gen Opterons, up to three links running in HT1.1 mode is your lot. Only with the arrival of a new socket specification will the HyperTransport upgrades be exposed.

As for cache memory, under the new Balanced Smart Cache regime, cache is now split into three levels. The 128KB L1 and 512KB L2 per core are familiar from previous Opteron processors. To that, a shared 2MB pool of L3 has been added for a grand total of 4.5MB per quad-core die. Quite a bit less, in other words, than the 8MB that existing 65nm Intel quads sport, much less the 12MB that the imminent 45nm Penryn revision will pack. That said,

Moreover, AMD reckons this multi-level hierarchy avoids the so-called 'cache thrashing' suffered by Intel's large shared L2 pool that occurs when cores fight over access.

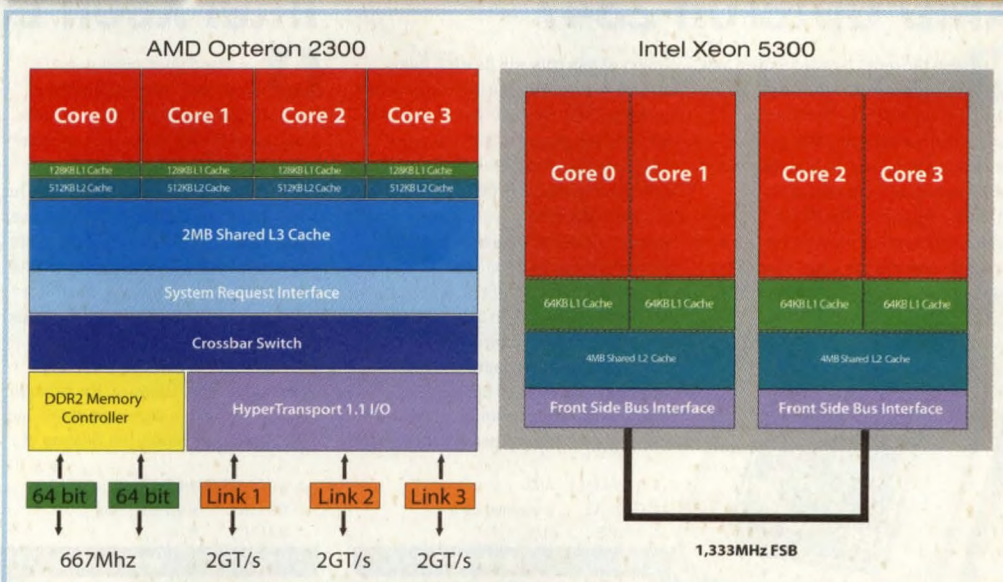
POWER MANAGEMENT

An issue that's rapidly heading to the top of the table of priorities for IT professionals is energy costs. It might be apocryphal, but we recently heard a story involving a data centre that saw its power bill leap by 180 per cent in the past year. Oil prices may eventually ease from their currently punitive levels, but with concerns over global warming on the up, the general trend towards increased power efficiency and performance per watt looks like a long-term goer.

With that in mind, the effort AMD has put into optimising Barcelona's gas guzzling could be crucial. The first of two key new technologies is Dual Dynamic Power Management. This enables completely independent power planes for the memory controller on one hand and the execution cores on the other. In simple terms, Dual Dynamic Power Management is about allowing more granular control of power delivery for the chip — during execute-intensive periods when there is little I/O activity, for instance, the voltage to the memory controller and northbridge can be reduced. The other technology is independent clock gating for each

historically AMD's superior bandwidth and system memory latency has offset its cache memory deficit. For cache connoisseurs, the configuration is unchanged with two-way associative L1-cache and 16-way associative L2-cache. The shared L3-cache is 32-way associative.

PROCESSOR SCHEMATICS





PERFORMANCE TEST RESULTS

The Sandra synthetic test results do not necessarily reflect real-world performance, but they do give a good indication of the basic throughput of a CPU's execution units. The cache latency results compare the relative latency costs of various levels on a CPU.

Elsewhere, we have a range of application tests that give an initial insight into Barcelona's real-world comparative performance. As ever with a new CPU architecture, it will take time for all its strengths and weaknesses to be exposed.

Key: ✓ Tick represents better score

Performance tests	AMD Opteron 2347	Intel Xeon L5335
Memory bandwidth	7,976MB/s ✓	5,545MB/s
Sandra Dhrystone arithmetic	57,529MIPS	73,731MIPS ✓
Sandra Whetstone FPU	42,821MIPS	48,200MIPS ✓
Sandra SSE	279,469 inst/s	336,281 inst/s ✓
Sandra cache latency 64KB/256KB	4ns/19ns ✓	7ns/8ns ✓
Sungard risk analysis	4 mins, 24 secs	3 mins, 35 secs ✓
Protein folding	1,038 pts	1,058 pts ✓
Cinebench 10 multi-core	1 min, 11 secs	1 min, 2 secs ✓
Cinebench 10 single-core	7 mins, 57 secs	6 mins, 21secs ✓
x.264 video encode	84fps ✓	80fps

execution core, something Intel's chips are not yet capable of. Without doubt, the ability to clock down individual cores under light load conditions will deliver significant efficiency benefits. Further adding to Barcelona's power efficiency credibility is AMD CoolCore, which allows functional blocks to be powered down when not in use. A typical example would be turning off the floating point units during a heavy integer-based work load. The impressive and significant combined result of all these measures is a quad-core chip that fits into the same thermal and power envelopes



WITHOUT DOUBT, THE ABILITY TO CLOCK DOWN INDIVIDUAL CORES UNDER LIGHT LOAD CONDITIONS WILL DELIVER BENEFITS

as existing dual-core Opterons, albeit at reduced frequencies.

At this point, we should briefly mention the related issue of AMD's new Average CPU Power (ACP) rating system. AMD says it historically took a more conservative approach to power ratings than Intel for its Total Design Power (TDP) rating, choosing to quote the worst case scenario rather than Intel's

'typical' rating. ACP is meant to redress the balance by offering a similarly typical measure of power usage under load. The clear insinuation is that one should compare AMD's new ACP rating to Intel's existing TDP numbers. In practice, such power ratings are best used only to compare chips in the same family: it's total platform power that really matters. The only

comment we will make is that the higher level of feature integration on AMD's chips means that where the CPU power ratings are similar, the edge in terms of overall platform efficiency clearly is with AMD.

Once again, AMD has persisted with conventional registered DDR2 (RDDR2) memory DIMMs in contrast to the more specialist FB-DIMMs required by Intel's competing Xeon

AMD QUAD-CORE

AMD Opteron 2347



K eep the remit tightly focused and this processor makes a lot of sense. For high-density data centre workloads that demand efficient multi-core scaling and low power consumption, AMD's new quad-core chip looks extremely attractive. The Direct Connect architecture and the attention it has paid to power consumption make sure of that. That said, we suspect the low-power 'HE'

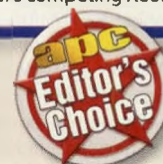
version of this chip will be even more attractive, even with the price premium it demands. Still, the fact that all the new Opterons will drop straight into most existing Socket F systems courtesy of nothing more than a BIOS update makes for a seriously simple quad-core upgrade. However, take the chip outside its comfort zone and the cracks begin to appear. Not only would it benefit from being made available in higher clock speed bins, but for number-crunching grunt, we're also not convinced AMD has delivered a big-enough per-core performance boost to worry arch-rival Intel as it prepares its new 45nm chips.

• SUPPLIER AMD
• ONLINE www.amd.com
• PRICE N/A
• VERDICT ★★★★★



INTEL QUAD-CORE

Intel Xeon L5335



A s a standalone quad-core processor, this is a great chip. Per-core performance is great, in both integer and FP. It's also power-efficient in this low-voltage trim and it's pretty cheap for a quad-core DP processor. Just a few years ago, this kind of horsepower would have cost thousands. If there are any weaknesses, therefore, they involve the platform. While the chip itself is a frugal power consumer, we have doubts about the platform with its FB-DIMM memory requirements and discrete northbridge chip. Likewise, the retention of Intel's rather creaky old frontside bus CPU interface is hardly the weapon of

choice where multi-socket performance scaling is concerned. At this price, in the two-socket segment, it's hard to beat. Too tough for the standard Opteron 2347, we suspect. However, the situation might just be reversed compared with the low power 'HE' variant of the 2347. Keep in mind that a new generation of 45nm Xeon chips with more performance and power consumption is imminent.

• SUPPLIER Intel
• ONLINE www.intel.com
• PRICE N/A
• VERDICT ★★★★★



platforms. AMD reckons FB-DIMMs can suck up several times more juice than their DDR2 equivalents. In a server that packs 16 DIMMs, to use AMD's potted example, typical peak FBDIMM power consumption could top 200W. That compares with around 75W for the same number of RDDR2 DIMMs. AMD claims Intel platforms on average can consume as much as 75 per cent more power.

Finally, as you might expect, given AMD's trailblazing reputation in this field, Barcelona's virtualisation technology has been overhauled. The big news is hardware acceleration of shadow paging, allowing guest operating systems to benefit from independent memory management. Also known as nested paging, AMD says this feature dramatically increases virtualisation performance by up to 79 per cent. No doubt, the greater bandwidth to system and memory courtesy of Direct Connect is also a boon when running multiple operating systems on a single box.

PERFORMANCE TESTS

Barcelona's performance is surprising; what with the emphasis AMD placed on the improvements made to Barcelona's IPC (or, instructions per clock) capabilities, it's hard not to be disappointed to note that it falls short of Intel's existing Xeon chips in several of our



The Opteron 2347 has closed the quad-core gap between AMD and Intel. The table below lists the differences between the Opteron and the Xeon.

benchmarks for equivalently priced chips. Even factoring in the slight clockspeed disadvantage, the 1.9GHz Opteron 2347 suffers compared with the 2.0GHz Intel Xeon L5335. In some regards, though, Barcelona performs much as you might expect of a simple quad-core revision of its existing K8 architecture. It's still a very solid PC processor, but not the major advance we were hoping for. It would also be entirely remiss of us not to point out that Intel currently ships Xeon chips running up to 3GHz. In other words, there's no doubting which architecture currently offers the most outright performance in the two-socket segment. But there is more to the

story. For starters, Barcelona is clearly competitive in most of our benchmark results, more or less matching the Xeon in our protein-folding test and squeezing in a surprising win in the high-compression video encoding benchmark. If AMD can combine this level of performance with a significant power consumption advantage, then that alone makes the new Opteron a winner for many high-density applications.

Unfortunately, we were unable to draw any first-hand power-efficiency conclusions from this first test as the AMD and Intel systems supplied to us were too different in terms of PSU and peripherals to make a valid comparison possible.

APC will look at this again when two closely matched systems become available. The Opteron chip tested here is a standard 84W 2347. Pay a bit more and you can get a low-power Opteron 2347 'HE' with the same clock speed but a 68W TDP and a 55W ACP.

Another question mark concerns multi-core and multi-socket performance scaling during seriously bandwidth-intensive work loads. As ever, AMD's memory bandwidth strength is a distinct advantage in such scenarios. We have been working very hard with both AMD and Intel to prepare tests which fully expose performance in this area. However, with a tight launch window and the need to carefully compile the benchmark binaries to suit each respective architecture, our Linpack and SPEC results were not ready in time.

This third-generation Opteron looks fit for its intended high-density applications where power efficiency is a key concern. And the backwards-compatibility provided by the Socket F stability makes it an extremely cost-effective upgrade option. However, for the new Barcelona quad-core architecture to be successful across all segments (workstation, servers and desktop) at the very least, AMD will need to ramp up the clock speeds. And fast.

Jeremy Laird

FEATURES TABLE

	AMD Opteron 2300 series (Socket F)	Intel Xeon 5300 series (Socket LGA-771)
Model tested	2347 @ 1.9GHz	L5335 @ 2.0GHz
Current clock speeds available	1.7GHz-2.0GHz	1.6GHz-3.0GHz
Manufacturing technology	Quad-core, single die, 65nm SOI	Quad-core, dual die, 65nm strained silicon
Cache memory	128KB L1 & 512KB L2 per core, 2MB shared L3	64KB L1 per core, 2x 4MB shared L2
Memory controller type	Dual-channel DDR2, integrated	Dual-channel DDR2, discrete
Memory support	Registered DDR2 DIMMs up to 667MHz	FB-DIMMs up to 667MHz
CPU I/O	2x HyperTransport 1.1 links, 2GT/s	1,333MHz FSB
Memory addressing	64-bit memory address extensions	64-bit memory address extensions
Instruction fetch bandwidth	32-bits/cycle	16-bits/cycle
SSE execution width	128-bits	128-bits
Floating-point scheduler depth	36 dedicated x 128-bit ops	32 uops, shared with integer
Key instruction sets	SSE, SSE2, SSE3, AMD 64	SSE, SSE2, SSE3, SSE4, EM64T
Voltage	1.15v	1.325v
TDP (ACP *AMD only)	84W (75W)	50W
Other	AMD Virtualisation with Rapid Virtualisation Indexing, AMD CoolCore and Dual Dynamic Power Management	Intel Virtualisation Technology, Intel Speedstep Technology

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Apple refreshes range

All of Apple's latest releases reviewed — and on the block.
Is Microsoft's reign on the desktop over?

By far the most important moments in the Mac calendar are those days when Steve Jobs steps up onto a stage with a projector, a stack of slides, and an eager audience. Or, if you prefer, his patented Reality Distortion Field. Either way, you know you're in for a good show. For all the rumours and gossip flying around the net, Apple knows a few things about keeping its surprises a secret. Even when everyone 'knows' about something like the iPhone, the result is worth the wait. With this much anticipation building up, only the biggest news will do.

This year, the expected change was a refresh of the whole desktop Mac line — iPods saved for a later announcement. On a purely

technical level, there's not a huge amount of difference between the Mac you could have bought a couple of months ago and the Mac you can buy today. The Intel chips are firmly bedded in, and most companies released a proper version of their software with support for them, rather than the variable Rosetta support we kept seeing last year.

NEW BUT FAMILIAR LOOK

Visually, things are very different. Apple has adopted an aluminium and glass design for its new systems, very reminiscent of its former pro-level hardware and newer consumer products such as the iPhone. The iMac is by far the biggest beneficiary of this, looking

nothing short of wonderful... at least, in a salesroom. How well the glass handles actual working environments is the big question, and we've already heard reports that the glare can be on the wrong side of fearsome if you don't have exactly the right lighting arrangements.

The Mac mini remains the poor cousin of the set, finally upgraded to a full gigabyte of RAM and a Core 2 Duo processor, but looking identical to the original grey box. Jobs' disdain for the mass of cabling that surrounds the average PC makes it pretty clear where he stands on this ignored piece of kit, and it played little part in the recent refresh. Indeed, the most surprising part is that it's still around; industry

watchers having called its demise for weeks before the speech.

Even now, its days are likely to be numbered, which would be a shame — clunky as it is, it's a decent little system, and by far the most affordable way to get a Mac. At the same time, the former black sheep of the family might be finding its way back into the fold. The original launch of Apple TV was a damp squib, largely due to its reliance on syncing with your PC, and the complete lack of content available from the iTunes Music Store. The possibility of some TV programs appearing gives the device some potential. The lack of HD video (or space for it, with even the larger of the two boxes only coming with 160GB of



APPLE COMPONENT 1 Apple keyboard

Continuing Apple's shift away from white plastic, the new Apple keyboard is now a super-slim aluminium board. In a nutshell, Apple has nicked the keys from its MacBook laptop, embedded them into a 0.4 cm thick aluminium tray and added in a few function keys to make the keyboard. It feels exactly like a laptop to use, though lower to the table top. We tested the wired version, but there's a more compact wireless version too. In terms of comfort, this board is a big step up from the old board because it sits almost flush

with the desk and requires practically no wrist elevation. The keys need only a little pressure to imprint commands. It gave us fast typing with minimal effort. You get F1-F19 keys plus additional multimedia keys for browsing playlists, and shortcuts to the Dashboard and Expose areas of the Apple OS. The twin USB ports, one at each long end, have been updated to USB 2.0 and there are no other ports on the board. We loved the design. The layout is simple but functional, and yes, it's Windows-compatible too.

CONTACT Apple
ONLINE www.apple.com.au
MARKET Everyone
PRICE \$69 (\$109 wireless)

✓ Stunning design; USB 2.0 support.

VERDICT ★★★★★

✗ May need a little getting used to.



space) and inability to access the net and download content to Apple TV itself is still a problem, but a problem that may be fixed in a future revision. Like Microsoft's Zune, the unit as is feels like an odd misstep from the company that's got most of its media push just right over the last couple of years, but one that can be fixed with just a few simple changes.

THE SOFTWARE TOUCH

Despite all the big hardware releases, it's the software side that really marks Apple's latest hearts-and-minds campaign. We're seeing the big push (on page 29) with the launch of OS X 10.5 — Leopard — but the key applications are already on the shelves. King amongst them is the iWork office suite, aimed not only at giving Apple users a powerful set of tools for getting things done, but delivering a precision-targeted slap to Microsoft's increasingly sweaty cheeks. First, it has to admit that the new Office 2008 for Mac wouldn't be ready until... well... 2008. Then Apple beats it to

market, with support for its own XML-based format, in a product that costs half the price.

The other two important tools in iWork are Numbers, a solid spreadsheet with a hint of Lotus 1-2-3, and Keynote, for the creation of PowerPoint-style presentations. Both are very much based on the Apple playbook, with Numbers especially almost making spreadsheets look sexy again. The most interesting thing about it is that it's geared much more towards consumer-level expertise than Excel, which drops you straight to a blank spreadsheet with talk of pivot tables and equations. You could use either of them for running a business, or for making a shopping list. The difference is it's friendly enough that non-spreadsheet owners are likely to be tempted to give it a try.

Finally, iLife leaves little to be desired. From iMovie to GarageBand, it's packed with tools that people actually want to use — and in the case of iMovie, totally rewritten. There's simply no comparison with the likes of

Windows Movie Maker and... well... Sound Recorder.

The weakest element of the whole set, and one of the biggest disappointments across the board, is the oft-criticised .mac. It's 10GB of space that offers easy syncing between systems, and there are a few online-specific features in iLife that make use of it, but it's still not very much for what you get. Anyone hoping to see Apple really take on the web will have to wait... at this rate, perhaps indefinitely.

With Apple now selling one in six laptops on the market and making increasing strides on the desktop, Microsoft should be getting worried. Big as Jobs' empire is, it's showing a remarkable ability to keep itself fresh and interesting, even as Ballmer's grinds along at an increasingly stagnant plod. With another refresh planned for the iPods, perfect support for Windows via virtual machines, and the arrival of the iPhone not too far off, now's the time to watch the competition.

**Richard Cobbett
& James Ellerbeck**



APPLE COMPONENT 2

20in Apple iMac 2GHz

The new iMac still follows Apple's clutter-free computer-in-a-screen design, but the skin has totally changed. Gone is the three-year-old, white plastic iMac shell, which has been replaced by an aluminium and glass exterior that we prefer. The 2.4GHz 20in model showed us some decent processing muscle. It was fast and able in our Photoshop and Cinebench tests, thanks largely to the ATI Radeon HD 2600 Pro graphics card update and new Santa Rosa board. Sadly, its components still can't be upgraded over time. The iMac remains virtually impregnable, with only the RAM bay open to



tinkering. The only real complaint was the glossy display: it's highly reflective and is like a mirror in some settings. But, for entertainment, there's a lot to like: especially DirectX 10 support, and the speaker update was generous too.

APPLE COMPONENT 3

Mac mini 1.83 GHz

Apple quietly upgraded its entry-level Mac desktop with Core 2 Duo chips this month. It was a long-overdue bump up. The new clock speeds are 1.83GHz and 2.0GHz. It carries forward exactly the same format as before: the same shell, ports, graphics card and drives. You still need to buy a keyboard, monitor and mouse separately. Some of the components are rather dated. The graphics card is stingy and still shares memory with the rest of the system. The hard drive is slow at 5,400rpm. The optical drive on the 1.83GHz model can't handle DVD-RW. Photoshop rolled along but got

bogged down during the chunkier jobs. Applying a radial blur to a 15MB JPEG at 100 per cent quality gave us enough time to put the kettle on. In benchmarking, it produced 20 frames per second compared to our iMac's 71.3fps. So, it's not much cop at graphics. Still, if all you want is basic specs for communications and the odd movie, and you already have the peripherals, then it has some value.



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• PRICE \$1,698

✓ Great design; speaker upgrade.
• VERDICT ★★★★★
✗ Default specs a bit low for the price.

• CONTACT Apple
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✓ Small; surprising performance.
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✗ Still very bare bones.

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Tagan 2-Force II 900W PSU

Pure power, no frills.

German engineering. Best in the world! Stereotypes aside, Tagan's series of power supplies have been impressing PC enthusiasts around the globe for a few years now. Though recently they've been known for going a tad over the top (who needs a 1,300W PSU, really?), the U33 and 2Force II lines of PSUs are well-respected.

This model, the 2-Force II TG900-U33 is a 900W power supply built for efficiency and quietness. The 900W measurement is a metric of the unit's average upper end output (as it should be), supporting a spike to 1,000W without a problem.

It's a no-frills solution and it comes in plain black with no fancy LEDs or software connections, but unfortunately also no removable cables. Though you'd only need a high-end PSU if you're powering a load of gear, especially graphics cards and hard disk drives,

it's still nice to make your PC breathe a little easier by removing unneeded cables. On the bench the Tagan 2-Force II TG900-U33 ran quietly and solidly. BIOS reported spot-on feeds for all 12v and 3.3v lines. It also ran surprisingly quietly. Though we wouldn't call it silent by any stretch, it was noticeably quieter than the Gigabyte Odin GT when run up side by side.

If you're in the market for a PSU that will provide clean, quiet power with none of the fancy frills, then the Tagan 2-Force II TG900-U33 will suit you down to the ground.

✓ Quiet; dependable.

..: VERDICT ★★★★★

✗ No removable cables.



Nick Race

Gigabyte Odin GT 800W PSU

A powerful supply with software control.

Making your hardware go as fast as possible requires a certain amount of feedback. You need to know, exactly, just how fast a particular component is working. Gigabyte has applied this feedback and control mentality to one of the last bastions of 'dumb tech' inside a PC — the power supply.

The Odin GT 800W PSU from Gigabyte is the first software-controlled power supply for the

home PC. The unit is bundled with a software application to monitor fan speeds, temperatures and voltages, but also lets you adjust them on the fly. This is useful if you want to cut noise down when not running intensive applications —

apply more power for software-based overclocking (video card

✓ Software control; good cables.

..: VERDICT ★★★★★

✗ Not for all; potential damage factor.

overclocking software could especially benefit from this) or dice with the devil and reduce currents to components to hopefully cut down on heat.

Connectivity is ample, with Gigabyte bundling 10 fully sleeved cables of varying lengths and connectors to suit your component load. There's also four thermometer diodes in the box, which allows you to read the temperature from various locations within your PC.

This isn't a power supply for everyone. If you're a set-and-forget type, the added expense from the software and control functionality is unnecessary. If you're likely to get down and dirty inside your machine, or run it right at its limits, this kind of feedback is invaluable.

Nick Race



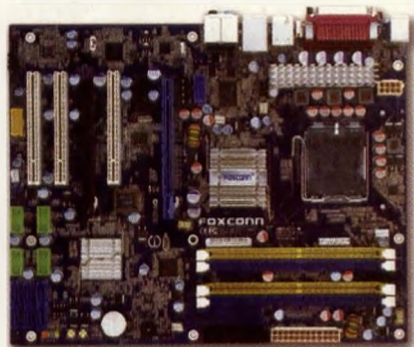


It all adds up; Foxconn **P35A-S** motherboard offer enhanced **reliability**, **usability** and **connectivity**. With a **100% SOLID Capacitor** design and an engineering process that improves durability, the P35A-S is reliable even under heavy loading **No more Ctrl+Alt+Delete.**

Reliability + Durability =



**No more
Ctrl+Alt+Delete**



P35A-S

- Supports Intel® Core™2 Quad, Core™2 Duo processors and Intel® next generation 45 nm multi-core CPU with 1333/1066/800 MHz FSB
- Dual DDRII 1066(OC)/800/667 x 4 DIMMs , max. 8GB.
- 2* PCIe x16, 1* PCIe x1, 3* PCI slots
- 6* SATAII , 1* eSATA , 2* 1394a , 12* USB 2.0
- Gigabit LAN , 7.1 channel HD Audio



G31MX-K

- Supports Intel® Core™2 Quad, Core™2 Duo processors and Intel® next generation 45 nm multi-core CPU with 1333(OC)/1066/800 MHz FSB
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- 4* SATAII , 8* USB 2.0
- Gigabit LAN , 5.1 channel HD Audio



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www.mcafee.com

KEYCHAIN GPS

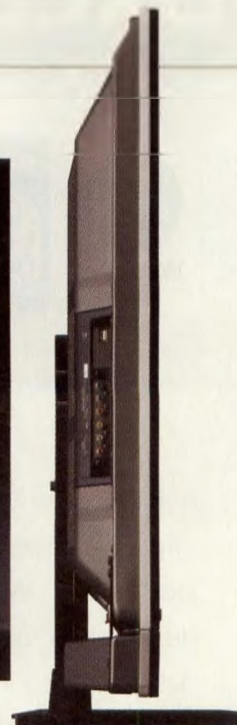
With the Freedom Mini GPS there is now no excuse for getting lost. The world's only keychain GPS receiver connects via Bluetooth to a mobile phone, PDA, PC or notebook and provides GPS directions. No mapping software is provided, but it will power most common GPS software on the devices it connects to. Price: \$189.95.

<http://tinyurl.com/3dlkrl>

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www.okiprintingsolutions.com.au



Pioneer Kuro PDP508XDA

The world's best HDTV has just been superseded, by this.

Pioneer's new Kuro plasma range proves there's more to a great television than just pixel count. With a thin black bezel and jet-black finish, the Kuro plasmas are big and beautiful but they don't dominate the room. They come in two resolutions: 1,366 x 768 and 1,920 x 1,080.

At the Kuro launch, Pioneer pitted its 50in Kuro PDP508XDA plasma against Sony's highly respected 46in Bravia LCD. Not surprisingly, plasma clearly outclassed LCD with blacker blacks, greater contrast and less motion blur. A vendor always screens content that favours its televisions, so we tried the same tests in our lounge room with the same televisions. Watching the AFL football in high definition, the two televisions were inseparable in terms of motion blur — which says a lot for LCD, because we expected plasma to come out ahead.

Even side by side with the Sony LCD, it's very hard to spot the Pioneer plasma as the lower resolution screen. While the plasma's colours are slightly more vivid, the trade-off is slightly less detail than the LCD. Professional calibration would probably rectify this.

Switching to a high-definition movie, the plasma's strengths shine

CONTACT	Pioneer
ONLINE	www.pioneer.com.au
MARKET	Everyone
PRICE	\$5,699

✓ Better than a 1,920 x 1,080 LCD.

VERDICT ★★★★★

✗ Only 1,366 x 768 pixels.

through. Blu-ray playback is exquisite. The blacker blacks and greater contrast mean you see tiny details in the shadows that are lost on the LCD, while in terms of sharpness and detail, the Pioneer is neck and neck with the higher-resolution Sony LCD.

Unfortunately, giant televisions also magnify any imperfections in the picture, but this is where Pioneer's amazing onboard video processing came into play — with DVD and standard-def digital television noticeably sharper and more vivid on the plasma than the LCD. When it came to deinterlacing 576i and 1080i content, the plasma also came out slightly ahead.

The Kuro range comes with built-in high-definition television tuners, but the speakers are a separate unit which attach to the bottom of the screen. The rear also sports component (YPbPr), composite, S-Video, VGA and two HDMI inputs, plus stereo audio inputs for each video source.

There are also coax and optical digital outputs for running to a surround sound amplifier. Down the

left-hand side are more video inputs along with a USB port for running music and photo slideshows from a memory stick.

One key advantage Pioneer's plasmas have over most televisions is they will play content filmed at 24 frames per second (24Hz — the native frame rate of Blu-ray and HD DVD) without converting it. Most televisions either convert 24fps content to 50 or 60fps, or refuse to play it at all. The conversion process can create motion shudder as 24 doesn't divide exactly into 50 or 60. The sad truth is most Blu-ray and HD DVD players convert the signal to 50 or 60fps before it even leaves the player, but there are a few 24fps players out there.

So what does all this mean? For starters, it means Pioneer are still making some of the world's best televisions. It also means if you've got the money to consider a high-end 42- or 50in 1,920 x 1,080 LCD, you'd be crazy not to add a 1,366 x 768 Kuro plasma to your shortlist. Buying an HD television isn't a numbers game — trust your eyes.

Adam Turner

Pioneer BDC-S02

Pioneer unveils its first BD-ROM drive for the PC, attempting to dispel the poor-value-for-money label.

The hi-def format war has been a bit of a non-starter for PC users. Despite a huge amount of attention being given to both Blu-ray and HD-DVD, there has been only a small handful of hardware to play the next-generation optical formats on computers. Instead, the focus has been on standalone players that sit under your TV.

Both sides have been most interested in promoting their discs primarily for movie playback — that's where the money is. But by initially ignoring us PC users, a vast swathe of potential customers have been left empty-handed. If you only want to watch Blu-ray films, you are forced to shell out for a pricey read/write drive, pay a similar price for a PS3, or even more for a standalone player. Now this initial oversight can be forgotten, as the first read-only BD-ROM drive is here, and at a cheaper price than other options.

By finally allowing PC users to pop an inexpensive Blu-ray drive into their chassis, a whole new market has been opened for Blu-ray movies, which some hope will be enough to tip the balance in the format's favour. If you just want to dabble with HD to see what the fuss is about, it's better to pick up a few films plus one of these drives than a console you might not want or a backup device you might not need.

CONTACT Pioneer Electronics
ONLINE www.pioneerelectronics.com.au
MARKET Everyone
PRICE \$479

✓ Blu-ray support for the desktop.

VERDICT ★★☆☆☆

✗ The BD writer is a better buy.

But don't hold your breath for a new generation of software on the new discs; that extra space with Blu-ray won't be used for PC applications just yet. 50GB of storage on a dual-layer disc may have benefits for software such as encyclopaedias that span multiple DVDs but, without a single dominant format, most PC developers will not rush to support Blu-ray at this point. Besides multimedia-heavy apps, not much currently stretches the 9.4GB capacity of even a dual-layer DVD. That is likely to change within a few years. From the point of view of storage space, Blu-ray's 25GB per layer places it well ahead of HD-DVD (15GB per layer) in this respect.

However, even if Blu-ray was the only high-capacity optical disc around, developers would rather use multiple DVDs than a single Blu-ray disc, to ensure the majority of people can use it. When the hardware is universal, the format war is over and prices have dropped, DVD will start to decline. It took years for companies to move from CD-ROM to DVD as the medium of choice to distribute software. Blue laser drives may take even longer to

achieve a similar market penetration to that of the DVD format today.

Despite our early frustration with the new generation of optical media, Pioneer's Blu-ray drive is a step in the right direction. Its release means there is now a drive at a similar price point to the Xbox 360's HD-DVD add-on (which also works fine on the PC). While movie companies continue wrangling over which format to support, this drive is unlikely to be the deciding factor in the format war, which will continue for the foreseeable future.

We are surprised it took so long before dedicated drives hit the market. With each side looking for any excuse to prematurely declare themselves the winner, you might think the PC market would have been an early focus — it is in fact a large market share after all. Part of the reason it wasn't could be the difficulties in manufacturing blue laser diodes early in the life of Blu-ray. With a limited number to go around, initially most went into set-top players, recorders and consoles. The arrival of this drive signals the end of those teething problems.

Orestis Bastounis

SPEED WITH QUALITY

Clearly, speed is the hot selling point, as all printer makers are highlighting it. Epson's new Stylus Photo R290 single-function laser printer claims phenomenal mono speeds of up to 38ppm and borderless 4 x 6in photo prints in 12 seconds. Another one for our Labs. Price: \$149.

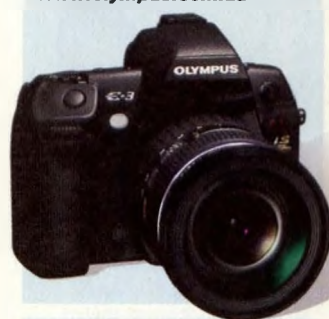
www.epson.com.au



THE FASTEST GUN

Olympus' new flagship DSLR camera, the E-3, features the world's fastest auto-focus, as well as extreme in-body image stabilisation mechanisms. Price: \$2,499

www.olympus.com.au



GOLDEN DRIVE

We enjoy the increasingly bizarre attempts of external hard drive makers to differentiate their drives. LaCie's Golden Disk 500GB external drive takes the cake. Designed by industrial designer Ora-Ito, its outside finish contains a small percentage of real gold. A steal at only \$269.

www.lacie.com.au



**ANSIS FOR YOUR BUCK**

BenQ has decided to get all aggressive with the pricing of its MP511 DLP digital projectors. With an RRP of \$999 it's the first 2000ANSI lumens machine to get under \$1,000.

www.benq.com.au

**MINI-MOUSE**

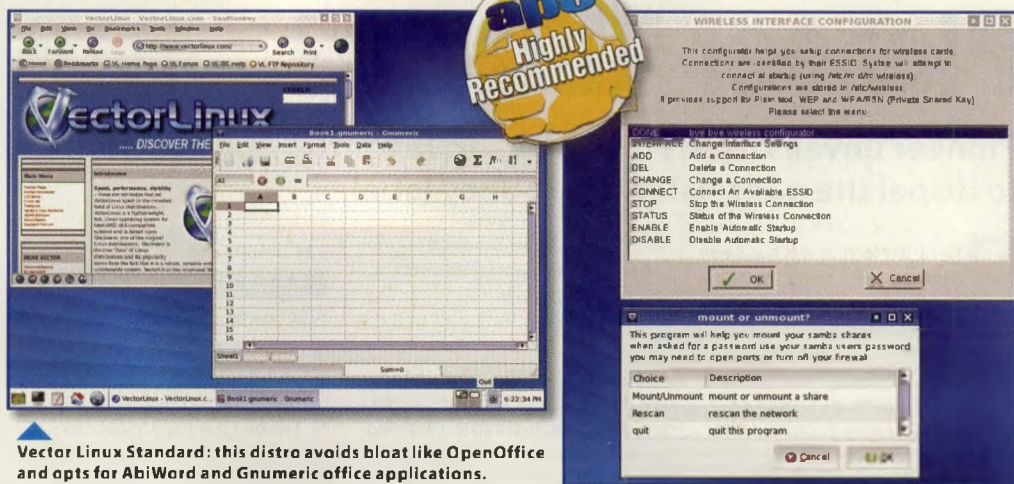
There's a nice bit of inventiveness with this mini Mobile Memory Mouse 8000, where the USB wireless transceiver also doubles as a 1GB memory key. You can also toggle between Bluetooth and 2.4GHz wireless in case of signal problems. The design's not too bad for a small mouse - no carpal tunnel complaints from us. Price: \$149.95.

www.microsoft.com.au

**VIRTUAL PHONE BOOTH**

Plantronics's Audio 480 Virtual Phone Booth headset for notebooks features sound-isolating earbuds and wind-noise reduction technology which help produce clear sound. It's compatible with both PCs and Macs (USB version only) and will be available in both analog (\$119) and USB (\$149) versions.

www.plantronics.com.au



Vector Linux Standard: this distro avoids bloat like OpenOffice and opts for AbiWord and Gnumeric office applications.

Vector Linux 5.8 Standard

As distros swell, can VL breathe new life into old hardware?

Most casual computer hobbyists tend to have an abundance of old hardware stored and possibly forgotten in the back of a wardrobe. But thanks to ever-increasing hardware support and lightweight Linux distributions, it's now possible to do far more with your old hardware than ever before.

I recently spent six months travelling around Asia. Roughly in the middle of the trip, I found myself in Hong Kong talking to a street vendor about his range of possibly dubiously acquired old laptops. Starved of technology for three months, and ravaged by laptop-lust, I inevitably walked away with an old Sony Vaio for the low low price of \$180. The laptop itself was definitely a very desirable product in its day: 500MHz, 128MB of RAM and a tiny form factor even by modern standards. It came installed with XP and Office 2003. Unsurprisingly, while usable for basic tasks, such as light surfing or checking email, the setup could not be described as responsive.

Once home, it was a perfect subject for testing out a lightweight Linux distribution. The main issue with this particular laptop was the lack of a CD-ROM drive or bootable USB support in the BIOS, for installing the new OS in the first place. USB booting is a relatively recent invention, and smaller laptops tend to opt for an external CD-ROM drive to save on space. This issue can be easily remedied by

• **CONTACT** Vector Linux Team
• **ONLINE** www.vectorlinux.com
• **MARKET** Everyone
• **PRICE** Free

✓ Works well with old hardware.

• **VERDICT** ★★★★★

✗ Installation can be painful.

purchasing a PCMCIA CD-ROM drive, but such beasts are harder to come by in recent years.

Research into different lightweight distros uncovered Vector Linux Standard. Based on the phenomenal Slackware OS, Vector Linux claims to be bloat-free, stable and able to run on older systems. What sets it apart from other distros is its claim that it can be installed directly from Windows using the downloaded ISO.

Installation required a tremendous amount of trial and error in order to get the installer running, but not the fault of Vector Linux itself. In order to get the installer working through Windows, I had to boot into DOS mode, which Windows XP doesn't support. With this in mind, the final solution to getting Vector installed was to install the Grub bootloader and configure it to boot a version of Puppy Linux from a USB key. From there it was possible to run Vector's installation program through a Linux command line.

Vector Linux Standard is now running happily on my ageing VAIO. Back when this laptop was new, getting all the components working under Linux would be a real chore, especially sound and network.

Thanks to open standardisation and acceptance of Linux from manufacturers, it's now quite easy to resurrect your old hardware.

Vector Linux Standard is one of the more well-thought-out lightweight distributions around. It uses a beautifully implemented xfce v4.4 as its desktop environment, which is clean, responsive and generally a pleasure to use even on our archaic test hardware.

The application choices are perfectly suited to the focus of the distribution. Avoiding such bloat as OpenOffice and instead opting for AbiWord and Gnumeric office applications. If you require more than the bundled applications, then package management is provided in the form of gslapt. The repositories that Vector uses are comprehensive, but not as vast as those offered by the bigger distros.

Wireless networking was easier than most to get working, thanks to the wvifonfig wireless manager. Even with an old external Wi-Fi card, we were up checking email quickly.

Vector Linux Standard may not have all the glitz of other bigger and more popular distros, but it's fast. Reviving reliable old hardware with a really fast OS is wholly satisfying.

Jim Haywood



MSI recommends Windows Vista® Home Premium

The World's First Turbo Notebook with Overclocking Capability

GX600

- Intel® Centrino® Duo Mobile Technology
- Intel® Core™ 2 Duo processor (2.0GHz, 4MB L2 Cache, 800MHz FSB)
- Intel® PM965 Express Chipset
- Intel® Next-Gen Wireless-N (Intel® Wireless WiFi Link 4965AGN)
- Genuine Windows Vista® Home Premium
- 15.4" WSXGA+WXGA LCD Display
- Nvidia GeForce 8600M GT 3D Graphic Card with 512MB VRAM
- MSI's Exclusive Turbo Drive Engine (TDE) Technology
- The Latest E- SATA Support
- Racer-Class Metal and Micro Processed 3D Speaker Aperture
- The Exquisite and Stylized Design and Colorful W, A, S, D Buttons for Gamers
- HDMI (High-definition Multimedia Interface) Output
- Digital/Analog 5.1 Channel Headphone Output
- DVD Super Multi/HD DVD

Performance **+ up to 20%**



Standard Mode



CPU Turbo Mode

* The testing results differs under different testing environment

TurboBook



HDMI
HIGH DEFINITION MULTIMEDIA INTERFACE



www.msicomputer.com.au

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**LACIE'S CHOCOLATE DISK**

But wait, there's also a chocolate drive. LaCie's 60GB 1.8in Little Disk is the colour of chocolate. Just make sure you don't mistake it for a block of Lindt. Price: \$179

**CANON CLOSE-UP**

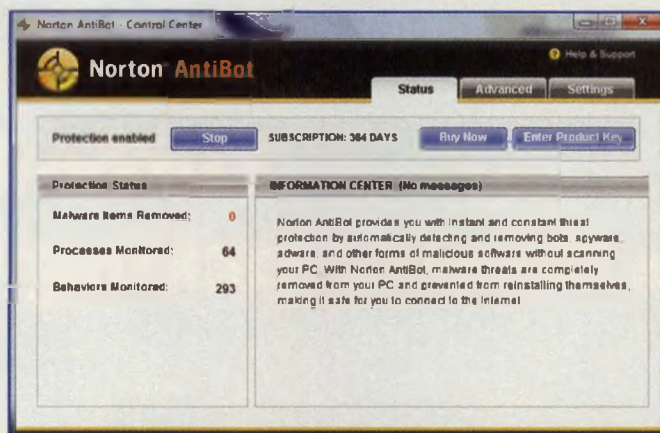
Canon has released the mother of telephoto lenses for digital SLRs, the EF800mm f/5.6L IS USM. Canon developed it for photographers working in sports and news photography. Prices TBA.

www.canon.com.au

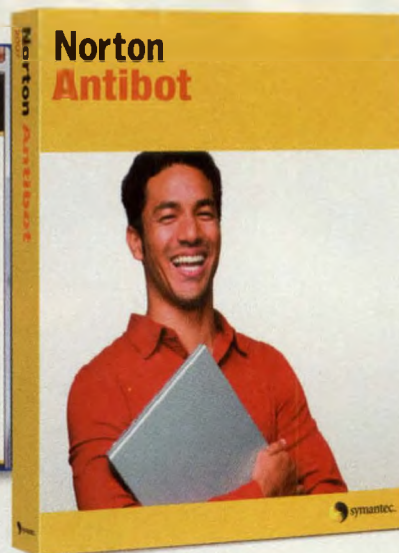
**PENTAX UNSHAKEN**

Pentax's Optio A40 not only has 12.0 megapixels but three types of image stabilisation in case you get the wobbles at the wedding. The SR (Shake Reduction) mechanism shifts the image sensor based on the amount of shaking detected by its gyro sensor. Then the Digital SR (Shake Reduction) mode automatically adjusts sensitivity to as high as ISO 3200 and the Movie SR reduces camera shakes during the shooting of movies. And it's not even a digital SLR. Price: \$449

www.pentax.com.au



With all its features, and at \$40, this is a reasonably cheap, if unnecessary, buy for any home user.



Symantec Norton AntiBot

A welcome addition to traditional security packages.

Online crime is rapidly becoming more damaging — financially, at least — than the drugs trade. Not so long ago, a virus was something made by teenagers to annoy users. Malware has evolved since then, with organised crime rings increasingly using trojans, rootkits and bots — remotely controlled PCs — for profit.

It's always worth taking the statistics of a company flogging solutions with a pinch of salt, but security giant Symantec claims to have found more than six million active bots in the second half of 2006, a 30 per cent increase on the previous half-year period. It's a worrying trend.

Bots are at worst downright dangerous for the user of an infected machine. Some install keyloggers and, if you're not careful, that's your credit card details and the headache of convincing the bank it wasn't you booking flights from Slovenia at 4am.

Infected machines pose a risk for all users, though. The more alarming prospect for zombie PCs, as they are known, is the ability to harness their power and coordinate them for criminal purpose. Botnets — infected PCs grouped together over the web — can be commanded simultaneously to launch denial of service attacks and spam attacks. And while phishing is little more

CONTACT	Symantec
ONLINE	www.symantec.com
MARKET	Everyone
PRICE	\$40

✓ Proactive protection.

★ ★ ★ ★ ★

✗ Needs to be run with other products.

than an annoyance for the internet-savvy, it's the easiest way to steal more unwitting users' details, making it one of the most lucrative forms of e-crime.

Control over the malware on this scale, even after it has infected a machine, makes bots different to regular viruses, as it allows for the perpetrator to upgrade bots to keep them resistant to security software.

The newly released AntiBot is something of a landmark for security software, moving out from the dreary annual update with a few more signatures added. Anti-bot software tackles a type of malware that has largely proved too stealthy for regular antivirus programs to catch. The difficulty regular security suites face in dealing with bots is that signature-based detection and prevention methods don't work. Bots evolve, and by the time security updates for their signatures are out, they've already morphed.

AntiBot looks for suspicious behaviour, rather than signatures, to detect them. This obviously has major drawbacks, not least the nuisance of finding safe programs being flagged up and blocked, and some smart bots might still slip

through the internet. Indeed, AntiBot is by no means perfect. But it's accurate within normal usage, looking for multiple behaviour characteristics from almost 300 profiled before it points a finger.

Symantec is not the only one in the market, though — Australian newcomer TrustDefender claims to offer anti-phishing, anti-rootkit and anti-bot capabilities when conducting any online transaction using similar technology, and you can see for yourself with the program's free trial.

This method is not a new way to deal with all malware, and nor does it threaten to make traditional anti-virus software defunct. It doesn't even fully remove a bot once caught, instead keeping it subdued until your regular scanner takes it out for good. AntiBot is being sold as a single package to the home market, but it has been designed to work alongside your existing setup, Norton or not, although it probably won't be long until it's incorporated into one of Symantec's flagship suites. While AntiBot is not without its problems, it's good for greater total security.

Ben Sillis

APC BUYERS GUIDE

Grab yourself a copy of our new annual special in which APC magazine's experts pick the best tech gear for you.

From notebooks to high-definition TVs, it's all in the most comprehensive tech buying guide in Australia.

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From the people behind the world's longest-published computer magazine*

* APC launched in May 1988 and is still Australia's premier authority on computing, as well as the world's longest-published PC magazine.

ON SALE NOW!





Affordable notebooks comparison

Affordable notebooks for first-time users and students can pack a surprising amount of performance and features, *Jenneth Orantia* discovers.

A couple of years ago, getting a decent laptop for under two grand was unheard of. Now, thanks to plummeting chip prices and cheaper laptop components, it's not only possible to buy a great notebook for a couple of thousand, but spending even half that much will get you a system that's more than good enough for day-to-day tasks like email and web browsing.

We invited vendors to submit an affordable all-rounder notebook that would be suitable for first-time laptop owners and students. What we got back were machines that were evenly spread in price, with almost half of them under a thousand dollars — or less than what you'd pay for a high-end smartphone. Performance was also evenly split up between Celeron, Pentium Dual-Core, Core Duo and Core 2 Duo (Napa, not Santa Rosa) chips, but at this end of the market integrated graphics are the norm, so don't expect them to be able to run any of the latest 3D games.

Even the few that offered discrete graphics like the Sony and ASUS notebooks stuck to entry-level chips, which are more designed for driving Vista's Aero glass interface than for proper gaming.

Of the companies invited to participate, a few declined to submit notebooks. Dell and Twinhead stated that their entry-level notebooks were on the cusp of being refreshed, while NEC failed to meet the submission deadline for review product and BenQ claimed they didn't have any notebooks that fit the criteria. Apple was unable to supply any review product within the necessary timeframe.

Naturally, mass-produced notebook components are cheaper to buy, so the overriding similarity in the notebooks we received didn't come as a surprise. Out of the ten notebooks tested, eight of them had 15.4in wide-screen LCD displays with WXGA (1,280 x 800 pixels) resolutions and glossy

finishes — each of which are branded under the company's own display technology like 'Acer CrystalBrite LCD' and Sony's 'Wide View True Color LCD'. Nor were we perturbed to find two notebooks from different companies — LG and MSI — with the exact same chassis. As it's cheaper to select a laptop design from a notebook ODM rather than develop a new system from scratch in-house, this is a route taken by some of the tier-2 vendors at the value end of the market.

Other common features include a DVD Super Multi optical drive, 80GB or 120GB hard drives, 4- or 5-in-1 memory card readers, and 6-cell batteries that are good for around two hours of run-time. None of the reviewed machines are what you'd call small, but the average travel weight is a reasonable 2.7kg — an acceptable load for short trips, but road warriors should plump for a more expensive sub-2kg machine.

The upside of having a larger

footprint is that the notebook can be used as a desktop replacement without needing to connect it to external peripherals. A mouse is usually more convenient to use than the touchpad, but otherwise the 15.4in screen is large enough to use comfortably for hours on end, while the keyboard is typically full-sized and adequately spaced for touch typing.

All the ports for connecting to the internet are standard fare on each machine, whether it's by connecting a dialup modem to the RJ11 port, hooking it up to a wired LAN using the Ethernet socket (10/100 Base T jacks are the norm, but a couple of laptops we reviewed came with Gigabit Ethernet), or connecting it to a wireless 802.11b or g network. Most mobile broadband services are available with USB modems, but if you won't want the modem dangling off the side of your machine, most of the notebooks in this roundup offer a PC Card or

HOW WE TESTED

Prior to testing, we updated all the notebooks using Windows Update and any third-party services from the notebook manufacturer. Any third-party antivirus programs were removed and the Windows Vista Sidebar was closed. We then tested each machine using 3DMark06 and PCMark05. General responsiveness was also tested while running multiple applications.

Before battery testing, we turned off wireless networking and set the power plan to 'Power Saver'. We then opened the Power Saver options, disabled the screen-off and computer-sleep settings and opened the advanced power settings. Here, we disabled sleep and hibernation

under the 'Sleep' setting, and under 'Display' we disabled the adaptive display and checked that the display would not be turned off. Under 'Processor power management' we turned the minimum CPU power to 5% and maximum to 50%. Under 'Battery' we set the low battery level to 5% and critical level to 0%. We then adjusted screen brightness to 40%. The Windows Audio volume was set to zero, and battery levels were tested by playing a DVD and timing how long it took before the batteries ran out. This is a stress test, so real-world usage typically results in 25% longer battery life than that achieved in the DVD run-down test.



WHAT WE GOT BACK WERE MACHINES THAT WERE EVENLY SPREAD IN PRICE, WITH ALMOST HALF OF THEM UNDER A THOUSAND DOLLARS

ExpressCard slot — some of them have both.

Only the LG ran Windows XP Professional out of the box — all the others use Vista, ranging from the Home Basic Edition through to Home Premium and Business. While going with the newest operating system may seem like the best option, it's worth considering switching to XP if you opt for one of the slower systems — especially for the notebooks with Celeron chips and/or 512MB of RAM.

If you're stuck on Vista as an operating system, then upgrading the RAM to a minimum of 1GB is recommended if you want it to run smoothly (or more if the notebook supports it). 2GB RAM sticks can now be had for \$150, and it's usually cheaper to get your notebook's RAM upgraded after you buy it rather than order it with the extra RAM installed — however, this voids the warranty on some.

As a general rule, entry-level notebooks tend to skimp on the

software that's included with the notebook. A trial version of antivirus software is almost always installed — usually Norton — along with a limited selection of proprietary system software, but productivity applications like Office and Outlook are extra. But don't assume you have to buy the expensive Microsoft applications to use the notebook for work. If you're a student, you'll be able to get a good discount on the Student version of Office; however, there

are also lots of freeware and lower-cost alternatives that you can either download to your computer (like OpenOffice) or use online (like Google Docs).

More annoying are the handful of notebooks that don't include DVD movie playback software or even the decoder needed to play DVDs through Media Player. Thankfully, you can find free DVD playback software for download on the internet, like the simple AVS DVD Player program. **STC**

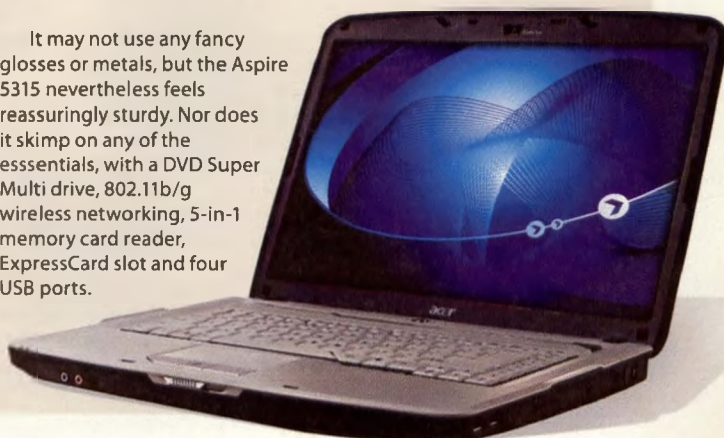
Acer Aspire 5315

The Aspire 5315 is no beauty queen, but at this price it really doesn't need to be. Acer redefines affordability by bringing it in at the dirt-cheap price point of \$749, and, regardless of the cost-cutting measures used, we think it's well worth a look for bargain hunters, high school students and those looking for a secondary notebook for home.

For the money, we weren't expecting much by way of performance, so we were pleasantly surprised after testing it.

Like the Compaq, it doesn't have enough firepower to run the 3DMark06 benchmark, and PCMark05 returned a predictably low score of 1,390; however, everyday usage tells a different story. A lacklustre 1.73GHz Intel Celeron chip and 512MB of RAM (running Windows Vista Home Basic) doesn't give the Aspire 5315 much to work from, but it was surprisingly responsive for an underpowered system — even with multiple applications and web pages open simultaneously.

It may not use any fancy glosses or metals, but the Aspire 5315 nevertheless feels reassuringly sturdy. Nor does it skimp on any of the essentials, with a DVD Super Multi drive, 802.11b/g wireless networking, 5-in-1 memory card reader, ExpressCard slot and four USB ports.





ASUS F5R

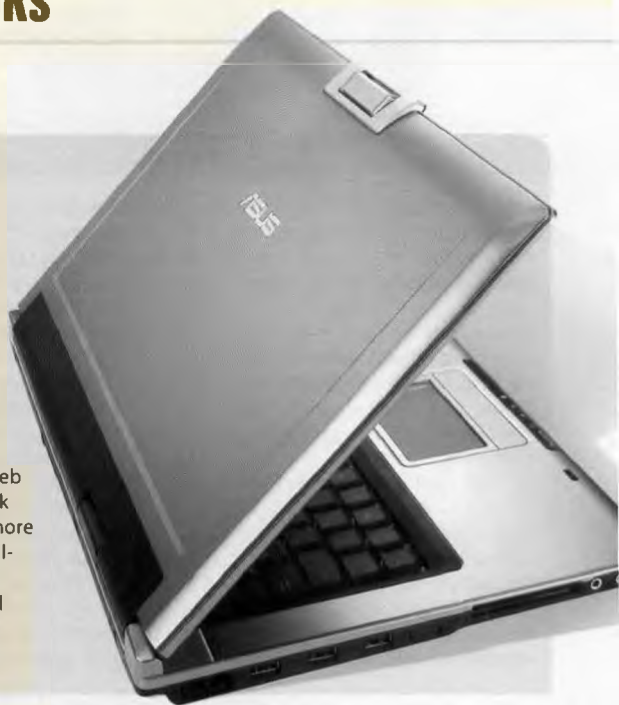
If it's value for money you're after, the ASUS F5R is a worthy candidate, offering a great mix of style, performance and functionality. Indeed, we had to double-check initially to ensure we'd gotten the right RRP.

For your well-spent dollar, you get a 1.86GHz Intel Core Duo T2130 processor, 1GB of RAM, ATI Radeon Xpress 1100 graphics, a 160GB hard disk (the largest in this roundup), Windows Vista Home Premium and a 180-degree rotatable 1.3-megapixel webcam.

The generation gap between Intel's Core Duo and Core 2 Duo chip is evident when you compare the ASUS's performance with the Core 2 Duo notebooks reviewed. While the ASUS scored 217 with the Radeon video card, the MSI

achieved a much higher score of 380 with its integrated Intel graphics. The MSI's 1.5GHz Core 2 Duo chip also fared much better in PCMark05, scoring 3,238 versus the F5R's 2,871.

Still, we found the F5R's performance to be more than acceptable for day-to-day tasks like web browsing and email, and, while its slick two-toned grey-and-silver design is more corporate than consumer chic, it's well-equipped for home use thanks to the generously sized hard disk, integrated webcam and excellent multimedia performance.



Compaq Presario C710TU

One of the first things that grabs you about the Compaq Presario C710TU is its bargain-basement pricetag. At \$849, it's the second-most affordable notebook in this roundup, and it distinguishes itself from the cheaper (yet similarly-specced) Acer by having longer battery life (20 minutes longer, at one hour, 50 minutes) and a slightly better PCMark05 score of 2,023.

However, in day-to-day use, the Presario certainly felt the more sluggish of the two notebooks, with most tasks taking longer than average to complete. As expected for a notebook in this price bracket, its specs are modest, including a 1.7GHz Intel Celeron M processor and 512MB of RAM. Paired with the resource-hungry Windows Vista Home Basic, it's no surprise to see the Presario struggle — a performance that would most

likely be improved by throwing more RAM into it.

The Presario is also frill-free on the appearance front, with a nondescript dark-grey colour scheme and the simple Compaq logo on the lid.

It's not bad for multimedia, though — DVD playback is smooth, and the glossy 15.4in wide-screen display is bright and vibrant, albeit with poor vertical and horizontal viewing angles.

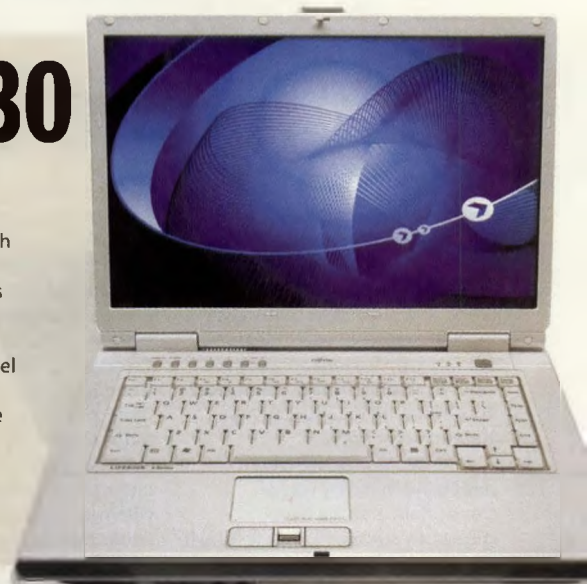
Fujitsu LifeBook A6030

The 'A' in the LifeBook A630's model name stands for 'Aspire', but it could just as easily be short for 'All-rounder'. Like the similarly priced Sony, it's designed for users that want a notebook that stands out in a crowd, but, while the VAIO CR is all bright glossy colours and flashing lights, the Fujitsu is more conservative, with a matte white casing that's distinctive without crossing the line into ostentatious.

This makes the LifeBook A630 equally suited for boardroom and bedroom use, and it ticks all the right tech boxes with its 2GHz Intel Core 2 Duo T7300 chip, 1GB of RAM and

120GB hard drive. It also sneaks in a few advanced features like support for 802.11n wireless networking, five USB ports and both PC Card and ExpressCard slots.

A PCMark05 score of 3,732 demonstrates that it's a solid workhorse for multi-tasking between email, web browsing and working on Office documents, but the integrated Intel GMA X3100 graphics mean you won't be using it for gaming any time soon. Nor is the LifeBook A6030's battery life particularly distinctive, scoring a below-average one hour, 45 minutes run-time in the DVD run-down test.



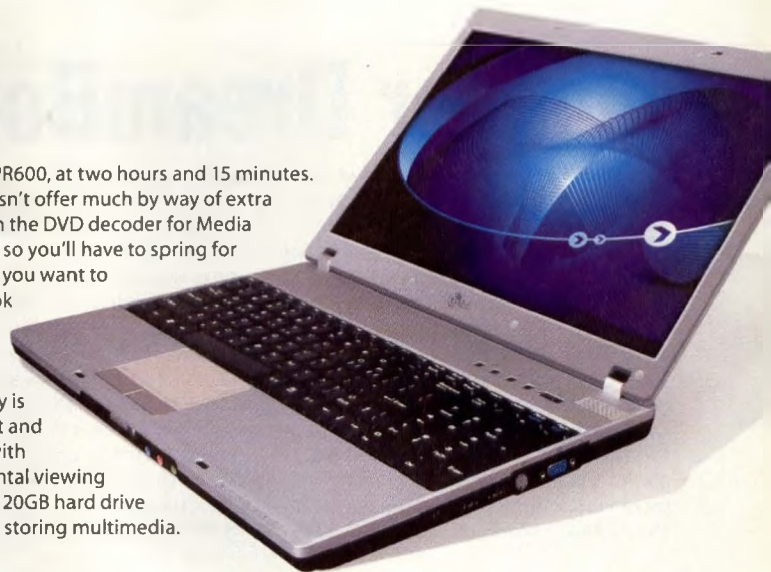
LG FS-3

Although Vista has been out for over a year, many notebook vendors are still offering systems with Windows XP installed, and the LG FS-3 is one such machine. Looks-wise, its chassis is identical to the MSI PR600, with the same love-it-or-hate-it keyboard and built-in numeric keypad, but it runs a slower 1.86GHz Intel Pentium Dual-Core T2130 chip. Essentially, it's a cheaper version of the PR600 with XP Pro installed instead of Vista, which many will find appealing.

It's also the best-performing system of the notebooks within spitting distance of a thousand dollars, with a 3DMark06 score of 163 and PCMark05 score of 2,988. Compared to the resource-hungry Vista, XP just feels snappier to use, with less of the graphical overheads that slow Vista machines down. Battery life

is similar to the PR600, at two hours and 15 minutes.

The FS-3 doesn't offer much by way of extra software — even the DVD decoder for Media Player is left out, so you'll have to spring for extra software if you want to use this notebook as a portable DVD player. On the plus side, the 15.4in display is pleasingly bright and well-saturated with excellent horizontal viewing angles, and the 120GB hard drive is a good size for storing multimedia.



Lenovo 3000 C200

The Lenovo 3000 C200 is the only notebook in this roundup that's blatantly business-oriented. If the conservative styling doesn't give it away, the 4:3 aspect ratio screen with anti-glare matte finish should — both of which are traits that predominate in work-issue laptops. Plus, it

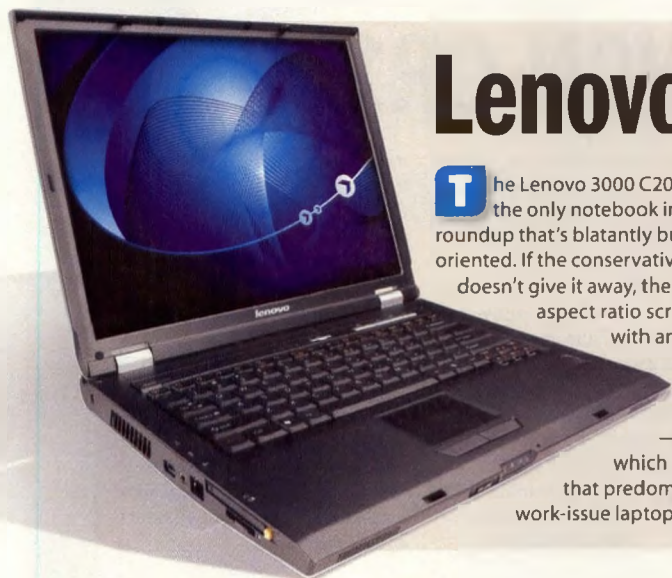
runs Windows Vista Business.

Lenovo's 3000 series is typified by the excellent Lenovo Care suite of systems diagnostic and maintenance software that comes preinstalled, making them a good choice for small-business users that don't have the luxury of their own IT staff.

But home users will also find value in this offering, even if it isn't great for multimedia — the 80GB hard drive is on the small side, and the non-wide-screen display,

limited viewing angles and underpowered speakers put a dampener on watching movies.

Like the other two sub-\$1,000 notebooks, the C200 runs a Celeron chip clocked at 1.73GHz, but it's the slower 430 chipset paired to 512MB of RAM and integrated Intel GMA 950 graphics. As such, performance isn't anything to write home about — it wasn't able to run 3DMark06, and a PCMark05 score of 1,666 placed it towards the bottom of the pack.



MSI PR600

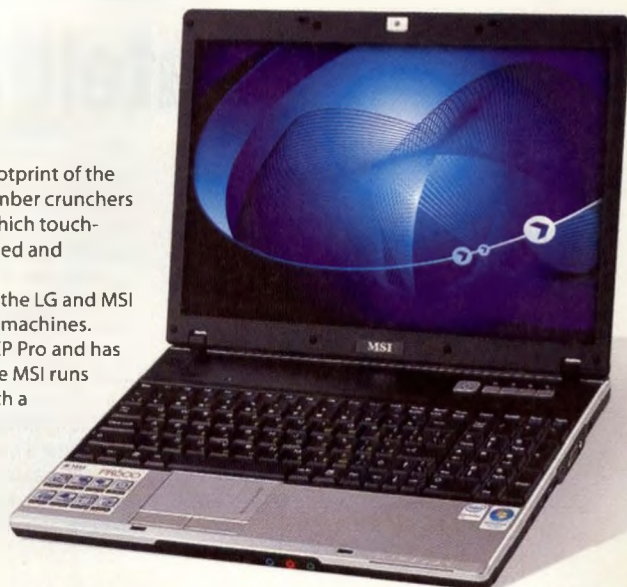
As the cheapest notebook with a Core 2 Duo processor in this roundup, the MSI PR600 is well worth a look. The functional black-and-silver plastic casing isn't likely to win any style awards, but at this end of the market it's actually one of the better-looking notebooks available.

We were particularly interested to see how it measured up against the pricier Fujitsu and Sony laptops. Predictably, the PR600's 1.5GHz clock speed had it lagging behind in PCMark05 with a score of 3,828, but its 3DMark06 score was only fractionally lower than the Fujitsu's at 380.

Aside from a few minor stylistic differences, the PR600's chassis is identical to the LG FS-3. Worth noting is the keyboard area, which crams a full numeric

keypad in by reducing the footprint of the main area — a move that number crunchers are sure to appreciate (but which touch-typers will mainly find cramped and annoying).

Chassis notwithstanding, the LG and MSI are two completely different machines. While the LG runs Windows XP Pro and has a Pentium Dual-Core chip, the MSI runs Windows Home Premium with a 1.5GHz Core 2 Duo chip plus throws in a 1.3-megapixel webcam and a longer two-year warranty — all at a reasonable \$200 premium.





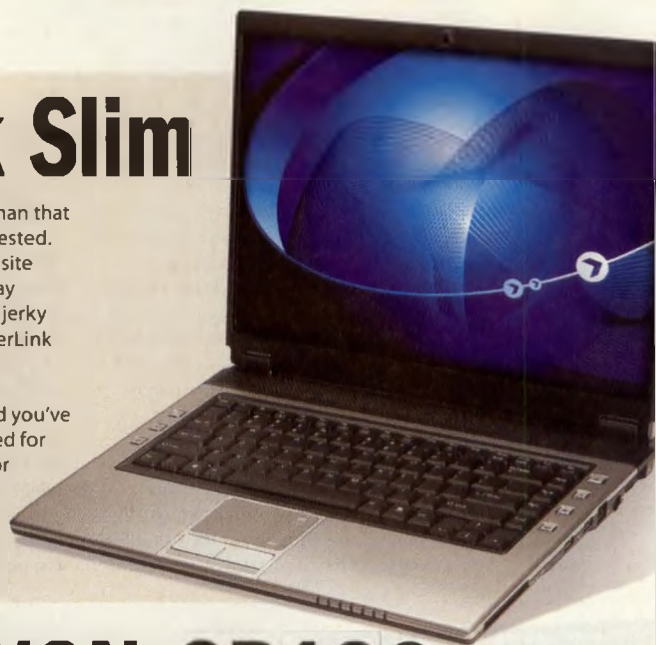
Pioneer DreamBook Slim

Armed with an impressive set of specs at an affordable price tag, the M66 does indeed seem like a dream notebook. The gun-metal grey lid and racy carbon fibre weave pattern at the hinge gives off a great first impression, and a solid set of tech specs including a 2GHz Intel Core Duo T2450 chip, 1GB of RAM and a 120GB hard drive make it appear well worth the extra \$175 you pay to get this notebook over the Toshiba.

Unfortunately, the DreamBook Slim M66 fails to live up to its promise. While it was able to run the 3DMark06 benchmark program, it returned a sub-par score of 58. The PCMark05 score was similarly

uninspiring at 1,435, which is worse than that achieved by the Celeron notebooks tested. The M66 doesn't come with the requisite Windows Media Player decoder to play DVDs, which is just as well given how jerky playback is using the third-party CyberLink PowerDVD.

Add to that tinny speakers and a mediocre 1.3-megapixel webcam and you've got a notebook that's poorly equipped for multimedia. It doesn't fare too well for productivity tasks either. While it's fine for surfing the net and checking email, the keyboard is rattly and makes a lot of noise while typing.



Sony VAIO VGN-CR13G

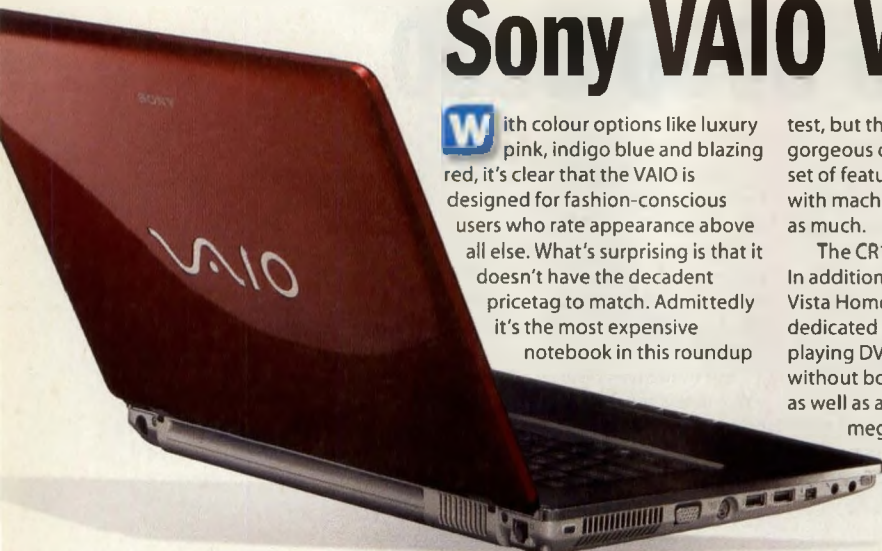
With colour options like luxury pink, indigo blue and blazing red, it's clear that the VAIO is designed for fashion-conscious users who rate appearance above all else. What's surprising is that it doesn't have the decadent pricetag to match. Admittedly it's the most expensive notebook in this roundup

test, but the excellent build quality, gorgeous design and respectable set of features make it competitive with machines that sell for twice as much.

The CR13G's forte is multimedia. In addition to running Windows Vista Home Premium, it has a dedicated instant-on AV mode for playing DVDs, photos and music without booting into Windows, as well as a fixed-position 1.3-megapixel webcam, dedicated multimedia keys and a tonne of preinstalled Sony

multimedia applications. Add to this a good-sized 100GB hard drive and you've got a machine that's well-equipped for home and personal use.

Sony's notebook is one of the only units submitted with a Core 2 Duo processor and discrete graphics — in this case a 2GHz T7100 chip and ATI Mobility Radeon X2300 graphics. Combined with 1GB of RAM, this returned the best benchmark results of 720 in 3DMark06 and 3,837 in PCMark05. Battery life is a decent two hours and 15 minutes.



Toshiba Satellite A200

The Toshiba Satellite A200 offers two attributes that are sorely missing in the sub-\$1,000 notebook segment: style and decent performance. It's not exactly eye-catching, but the A200's curvy black casing and champagne-coloured keyboard area is quietly attractive — especially when compared to the other notebooks in this price range.

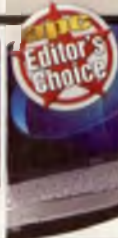
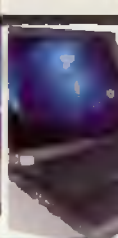
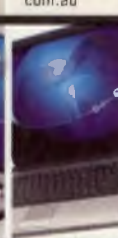
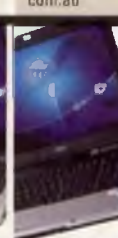
It's also the only laptop under a grand to offer a non-Celeron processor; in this case, the 1.73GHz Intel Pentium Dual-Core T2080. Performance was noticeably zippier in general use — an observation backed up by the PCMark05 score of 2,393 — but we'd still recommend upping the default

512MB memory to at least 1GB to run Windows Vista Home Basic at a decent clip. Like the Acer, Compaq and Lenovo notebooks, the A200 wasn't able to run 3DMark06.

A vibrant 15.4in display coupled with excellent front-firing speakers make the Satellite A200 ideal for multimedia, and the two hours and 15 minutes of battery life should comfortably see you through most feature-length flicks while on the go.

The 80GB hard drive is a tad limited for storing a music and video collection in, but this is easily forgiven when you compare the rest of the A200's specs to other similarly priced laptops.



	SONY VAIO VGN-CR13G	FUJITSU LIFEBOOK	TOSHIBA SAT A200	COMPAQ PRESARIO	ACER ASPIRE 5315	LENOVO 3000 C200	LG FS-3	PIONEER DREAMBOOK	MSI PR600	ASUS F5R
CPU (including clock speed)	Intel Core 2 Duo T7100 2GHz	Intel Core 2 Duo T7300 2GHz	Intel Pentium Core Duo T2080 1.73GHz	Intel Celeron M 530 1.7GHz	Intel Celeron M 530 1.73GHz	Intel Celeron M 430 1.73GHz	Intel Pentium Dual-Core T2130 1.86GHz	Intel Core Duo T2450 2GHz	Intel Core 2 Duo T5250 1.5GHz	Intel Core Duo T2130 1.86GHz
RAM	1GB DDR2	1GB DDR2	512MB DDR2	512MB	512MB DDR2	512MB DDR2	1GB	1GB	1GB	1GB DDR2
Chipset	Intel 965GM	Intel 965GM	Intel GMA 950	Intel GML 960	Intel GL960 Express	Intel 945GM	Intel 943GML	VIA VN896	Intel 965GM	ATI Radeon Xpress 1100
HDD	100GB	120GB	80GB	80GB	80GB	80GB	120GB	120GB	120GB	160GB
Optical drive	DVD Super Multi (DVD+/- /RAM-RW) Dual-Layer	DVD Super Multi Dual- Layer	DVD Super Multi Double/ Dual-Layer	DVD Super Multi Double Layer	DVD Super Multi	DVD Recordable (Dual-Layer)	DVD Super Multi Dual- Layer	DVD Super Multi Dual- Layer	DVD Super Multi	DVD Super Multi Dual- Layer
Screen size	14.1in	15.4in	15.4in	15.4in	15.4in	15in	15.4in	15.4in	15.4in	15.4in
Native resolution	1,280 x 800	1,280 x 800	1,280 x 800	1,280 x 800	1,280 x 800	1,024 x 768	1,280 x 800	1,280 x 800	1,280 x 800	1,280 x 800
Graphics	ATI Mobility Radeon x2300	Intel GMA X3100	Intel 943GML	Intel GMA X3100	Intel GMA X3100	Intel GMA 950	Intel GMA 950	VIA VN896	Intel GMA X3100	ATI Radeon Xpress 1100
Wireless	802.11a/b/g; Bluetooth	802.11a/g/n; Bluetooth	802.11b/g	802.11b/g	802.11b/g	802.11b/g	802.11b/g	802.11b/g	802.11a/b/g	802.11a/b/ g; Bluetooth
Battery	6-cell	6-cell	6-cell	6-cell	6-cell	6-cell	6-cell	6-cell	6-cell	6-cell
Expansion	ExpressCard; Memory Stick, SD	PC Card Type; ExpressCard; 4-in-1 card reader (SD/MS/MS Pro/xD)	ExpressCard; 5-in-1 card reader (SD/ MS/MS Pro/ MMC/xD)	5-in-1 card reader (SD, MMC, xD, MS, MS Pro)	ExpressCard; 5-in-1 card reader (SD, MMC, MS, MS Pro xD)	PC Card slot; ExpressCard; 5-in-1 card reader (SD/ MMC/xD/MS/ MS Pro)	PC Card Type II; 4-in-1 card reader (SD/ MMC/MS/MS Pro)	N/A	PC Card Type II; 4-in-1 card reader (SD, MMC, MS, MS Pro)	4-in-1 card reader (SD/MMC/ MS/MS Pro); ExpressCard
USB	3	5	4	3	4	4	4	3	4	4
Weight	2.5kg	2.9kg	2.72kg	2.9kg	2.8kg	2.78kg	2.6kg	2.6kg	2.68kg	2.65kg
Dimensions (WDH)	335 x 249 x 21mm	360 x 265 x 39.8mm	362 x 267 x 39.3mm	357 x 257 x 41mm	366 x 274 x 42.6mm	338.7 x 279 x 37.9mm	358 x 259 x 27mm	360 x 267 x 25.4mm	358 x 259 x 35mm	367 x 262 x 35mm
Other (eg. fingerprint scanner)	Integrated 1.3-megapixel webcam	Fingerprint reader	N/A	N/A	N/A	N/A	N/A	1.3-megapixel webcam	1.3-megapixel webcam	1.3- megapixel webcam
Operating system	Windows Vista Home Premium	Windows Vista Home Premium	Windows Vista Home Basic	Windows Vista Home Basic	Windows Vista Home Basic	Windows Vista Business	Windows XP Professional	Windows Vista Home Basic	Windows Vista Home Premium	Windows Vista Home Premium
Price	\$1,899	\$1,759	\$999 (after \$100 cashback)	\$849	\$749	\$999	\$1,099	\$1,175	\$1,299	\$1,299
Warranty	1-year	2-year pickup and return	1-year international parts and labour	1-year parts and labour	1-year courier pickup and return	1-year parts and labour	1-year	1-year return to base	2-year limited international hardware warranty	2-year limited international warranty
Online	www.sony.com.au	www.lifebook.com.au	www.isd.toshiba.com.au	www.compaq.com.au	www.acer.com.au	www.lenovo.com.au	www.lge.com.au	www.pioneercomputers.com.au	www.msicomputer.com.au	www.synnex.com.au
										
	Stylish; great performance	802.11n WiLAN	Good for multimedia.	Affordable.	Bargain price tag; sturdy.	Easy to maintain.	Decent performance.	Large hard disk.	Good performance.	Packed with features.
	Colours may not appeal.	Below average battery life.	Limited RAM	Sluggish; unattractive.	Not enough power.	Poor performance.	Cramped keyboard.	Poor performance.	Cramped keyboard.	Average performance.
Verdict	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆



ASUS launches \$499 cut-down notebook



It was originally going to be sold only to schools, but ASUS will now launch it to retail next month. *David Flynn and Nick Race* assess the Eee PC in our Labs.

A SUS's \$499 Linux-powered 'primary school subnote' is going mainstream. The oddly named Eee PC was originally created for students from grades three to five who need to learn basic computer skills but don't require full PC functionality — but grown-up computing enthusiasts have been clamouring to get their

hands on this pint-sized portable. After stocks of the low-cost laptop were stamped on at its first day on sale in Taipei last month, ASUS's Australian office has decided to set the Eee PC loose from its previous 'tender only' order process. An ASUS spokesperson said: "Initially the Eee PC, aimed at the education market, was to be available only via

special tender; however, due to the enormous demand, ASUS is now considering extending to retail, and are in the process of selecting our partners of choice."

With a 7in screen, a footprint barely two-thirds the size of this page (22.5cm x 16.5cm), a slim profile (tapering from 2.1cm to 3.5cm, front to rear) and a bare 890g weight, right off the bat it was clear that the outrageously portable Eee PC could fill the gap between tiny PDAs and conventional laptops.

APC Magazine assessed one of these new subnotebooks. First impressions were positive. Its diminutive size didn't compromise on its sturdiness; a good thing considering it's potential home in a primary school backpack. The Eee's screen was small but clear, around the same quality as mobile phones, running at a 800 x 480 resolution.

Tapping out text was a little picky at first, considering the small size of the keys, but it didn't feel overly cramped; an adult user would get used to it quickly.

The units responsiveness with the built-in software was good too: video playback was acceptable, and sound very good considering the space constraints.

Using the heavily customised Xandros Linux distro was a breeze. ASUS has split up the Eee's built-in apps to work, internet, education and entertainment subcategories, with large icons dominating the desktop under each tab. It gives the unit a feel of a CE device rather than a PC. It's loaded with Firefox, OpenOffice and some basic KDE apps (like a dictionary, periodic table app and audio recorder) and will work for students right out of the box.

We've no doubt that tinkerers will find other innovative uses for it, such as a dedicated BitTorrent machine (just plug in a USB 2.0 hard drive) or a simple set-top box using the Linux build of the Xbox Media Centre.

While ASUS has four models in the Eee PC family, Australian



The size of ASUS's 'subnotebook' has to be seen to be believed.

Modern computing power in the palm of your hand.



Nice, shiny and white. The contemporary look of the Eee contradicts its price tag.

Internet-related applications at your fingertips.



The keyboard is a bit on the small side, but users will adapt.



Applications available in the work subcategory.

Educational resources aimed at the school student user segment.



The Eee caters for entertainment purposes as nimbly as it does work and connectivity.

Eeenthusiasts will be offered the 4G, also known as the model PC 701. Inside its white clamshell sits standard PC technology starting with an Intel 900MHz Celeron M processor, 512MB of RAM, 802.11g wireless plus 10/100 Ethernet, three USB ports, a multi-format memory card reader and a 4GB solid state hard drive.

The OS is a Xandros-based variant running KDE, but with two user interfaces: a tab-based 'Easy Mode' for beginners, and a more conventional Windows XP-like desktop.

However, ASUS's quoted battery life appears leaner than you'd expect from a parsimonious portable: even with the solid state drive, low-voltage Pentium M chip and a lean Linux build, the manufacturer lists a mere 3.5 hours from the 5200 mAh battery.

This figure is expected to markedly improve next year, when a mid-2008 refresh will see ASUS drop in a 65nm Merom-class chip to reduce power consumption by almost a third (this in turn will allow them to remove the tiny cooling fan required by the 90nm Celeron

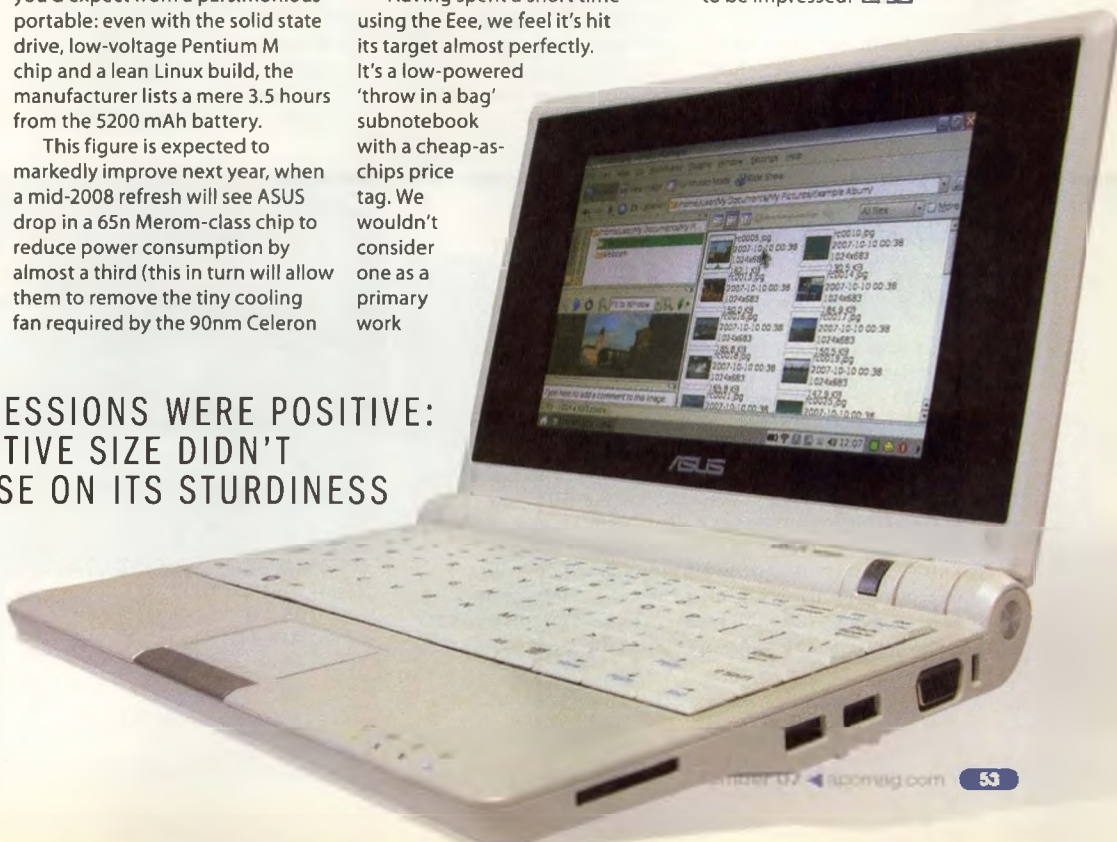
processor, thus further extending battery life).

Having spent a short time using the Eee, we feel it's hit its target almost perfectly. It's a low-powered 'throw in a bag' subnotebook with a cheap-as-chips price tag. We wouldn't consider one as a primary work

machine, but as a student tool or travellers companion, it's hard not to be impressed. **ITC**

FIRST IMPRESSIONS WERE POSITIVE: ITS DIMINUTIVE SIZE DIDN'T COMPROMISE ON ITS STURDINESS

The Eee PC runs on a heavily customised version of Xandros Linux.





Whether it's for lounge room or boardroom use, there's a projector to suit.



Multimedia Projectors

Nick Race gets into the nitty gritty of projection technology.

For a home cinema, choosing between LCD and plasma is often the choice most people are stumped with. But if you really want the cinema experience, then you can't go past a projector. Although the environment you

need to let this technology shine is more finicky than just switching on the telly when you get home from work or school, there's no competition when it comes to having a proper home theatre.

THE TECHNOLOGY: DLP, LCD AND LCOS

Three main schools of data and video projectors exist. DLP (or Digital Light Processing), created by Texas Instruments in the '80s. LCD (or Liquid Crystal Display),

with the first display made in the '60s at RCA Laboratories and LCOS (or Liquid Crystal on Silicon), a '90s technology most often seen in projection TVs.

DLP projectors use a matrix of tiny mirrors, each representing a

PROJECTORS Sony VPL-AW15

Sony's 3LCD HD home theatre projector is a steal at under \$2,500. What you get for your money here is a 1,280 x 720 model with a good range of inputs at the right price.

The VPL-AW15 includes connections for HDMI, component, S-Video and composite video, plus D-Sub for PCs. Its advertised 12,000:1 contrast ratio is a little silly, but in use the projector gives a clear, bright image with very good but not fantastic contrast in darker areas. There's little motion blur, and the high resolution goes a long way to removing the 'fly screen' effect of some LCD projectors.

Sony doesn't advertise a brightness in lumens for this projector, but you can get away with moderate light in the room.



CONTACT Sony
ONLINE www.sony.com.au
MARKET Everyone
PRICE \$2,499

✓ Good price, good image.

.. VERDICT ★★★★★

✗ Another HDMI port would be handy.

PROJECTORS

Epson EMP-DM1

Epson has a handle on the home theatre in a box. The EMP-DM1 is the next in line, including a VGA 854 x 480 wide-screen projector, plus a DVD/CD player and stereo speakers in one little package. In context, they pack all this in under 4kg.

For other devices it includes connectors for composite and component video. On the bench, the video quality from the 3LCD unit is fine using the built-in DVD source, but the audio is perhaps less than we're used to in a home cinema environment. You can't go past the convenience, though.

CONTACT Epson
ONLINE www.epson.com.au
MARKET Everyone
PRICE \$1,199

✓ Portability; self-contained.

VERDICT ★★★★★

✗ Not HD; poor built-in speakers.



single pixel, which can move rapidly to reflect light from the lamp. Each mirror can either be on or off, by reflecting light through the lens or into the projector's chassis. Faster switching produces grey scales.

Colour is produced by projecting through one or more wheels which colour the light. DLP projectors that use a single array of mirrors can suffer from what's termed the 'rainbow effect' — a shadowing of the colours that make up the wheel. This happens as each colour is projected one at a time. Your brain combines these colours into the full gamut shown in the image, but some see it regularly. Multiple-array DLPs don't suffer from this effect (as it is

continuously projecting all the colours at the same time). The more wheels (or, the faster the wheel rotation), the less noticeable the effect.

LCD technology should be familiar to most PC and notebook

through, or not. Different current levels force different angles of orientation of the crystals, allowing for varying levels of brightness. The downside of LCD is the dreaded 'fly screen' effect, where you can see the gaps between the

In place of mirrors, coated liquid crystals provide the binary switching to produce the image. Though LCoS provides the clearest images, and are theoretically the cheapest price, it is still very difficult to produce, drastically



LCoS IS A MUCH NEWER TECHNOLOGY THAT COMBINES THE MIRROR EFFECTS OF DLP AND THE LIQUID CRYSTALS FROM LCD PROJECTORS

users. The same principle applies as in LCD TVs and monitors. Light from the lamp shines through an array of liquid crystal, which, depending on the current applied to it, can be oriented vertically or horizontally, letting it shine

pixels. Higher resolutions show less fly screen (unless you're really really close).

LCoS is a much newer technology that combines the mirror effects of DLP and the liquid crystals from LCD projectors.

limiting the quantity of LCoS projectors on the market.

IN YOUR HOME

Installing a projector at home is often an expensive proposition. The factors that surround the

PROJECTORS

NEC VT-595G

This model is a workhorse data projector, solely designed for use in boardrooms, on the road, and wherever a presentation needs to be given.

Running at XGA (1,024 x 768) resolution, it's technically HD but far from widescreen, conforming to a PC 4:3 ratio. The NEC pumps out 2,000 ANSI lumens, with a 600:1 contrast ratio.

NEC's 'Squashshot' technology automatically adjusts the keystone of the projector for a straight image. Auto colour correction also compensates for the colour of the projection surface, so the image still looks right even on non-white walls. Very handy for plopping the projector down, plugging in and getting started. It offers audio, D-Sub, DVI, S-Video and composite video connections and weighs in at under 3kg.

CONTACT NEC
ONLINE www.nec.com.au
MARKET SMB
PRICE \$1,600

✓ Squashshot and colour correction.

VERDICT ★★★★★

✗ Needs a resolution jump.





PROJECTORS

InFocus Work Big IN34

This business projector from InFocus is the brightest we looked at. It outputs at 2,500 ANSI lumens in bright mode or 2,000 lumens in quiet mode. It's a 4:3 model, in line with PC resolutions, and has a native DLP resolution at XGA (1,024 x 768). It uses an x4 colour wheel (two segment, double-speed), and on the bench showed little rainbow effect: a good result.

The IN34 supports inputs from DVI, composite, component and S-Video, as well as D-Sub 15 VGA. It weighs in at 2.2kg fully loaded. There's a mono speaker, but it's pretty basic. For a good-quality, bright image, there's much worse than the InFocus Work Big IN34.

CONTACT InFocus
ONLINE www.infocus.com
MARKET SMB
PRICE \$2,495



✓ Clear image; super bright.

VERDICT ★★★★★

✗ Poor sound; custom cable required.

correct installation of a projector for maximum enjoyment are myriad. There's a lot to consider. Ideally, you need to be able to control the lighting in the room completely. It's no lie that projection (along with plasma screens) looks best in the dark.

Primarily, too much light in the room will reduce the contrast ratio of the images you're trying to watch. That means washed-out blacks, loss of detail in darker areas and, overall, a less satisfactory experience. If you can close the blinds or curtains and lower the lights, or turn them off altogether, then you'll have a better image.

The second factor that needs to be taken into account is the positioning of the projector. Ideally, the projector should be

mounted behind the viewer, most easily over their heads. Though this doesn't affect image quality (the viewing angle of a projected image is 180 degrees), having the projector in front is distracting due to light leakage from the side of the unit. Also, keep in mind that home theatre projectors tend to be quite large, so allow plenty of space if popping it on a shelf.

Other options include mounting the projector on the ceiling, ideally by a purpose-made projector mount. This enables it to be up and out of the way, unlikely to be interrupted by someone moving around the room, and lets you reclaim some of the space available. There are a couple of downsides to ceiling mounts — you need to be able to run both

power and video or data cabling to the projector, often meaning long runs of cable and more holes in the ceiling and walls, so it's unsuitable for renters. (Not to mention getting up there to change the projector's lamp every so often.)

IN THE OFFICE

The pure data projector has made way for the newer 'multimedia projector', which, in essence, is just a higher-quality data projector, closer to what you might use in your home. Older data projectors tended to be slower, lower-end models, as they mainly dealt with static or near-static images (think PowerPoint slides and spreadsheets). Today they're capable of more and are often able to put out quite a good image for

video presentations. Occasionally these projectors include built-in speakers, though they'll offer far from a cinema experience!

The other key difference between a projector designed for your home and one that's aimed at the office is the connectivity. Work projectors often include options for Wi-Fi connections, to do away with the dreaded (and often forgotten) VGA cable, and USB ports for presentations directly off memory keys. Also important to note is that the brightness of business projectors tends to be high, but contrast ratios are lower. Most often, presentations are given in rooms that cannot be darkened completely, and so contrast ratios are lower, as they mostly deal with high-contrast images. **ETC**

PROJECTORS

Sanyo PLV-Z5

Sanyo's one of the unsung heroes in the home theatre projector market. The replacement to the well received PLV-Z3 is the Z5, a 1,280 x 720 HD projector for home theatre that does turn heads.

It's an LCD projector with a light output of 1,100 ANSI lumens, and a marketing-crazy 10,000:1 contrast ratio. Dual HDMI ports, plus a set of component video ports, D-Sub and S-Video make up the connectivity. There's little not to like about the Z5. On the bench it output a crystal clear and great-looking image, with very little blur or distortion.

Our only gripe is that it's slightly louder than the Sony VPL-AW15, but it's only noticeable if you're right next to it.

CONTACT Sanyo
ONLINE www.sanyo.com.au
MARKET Everyone
PRICE \$3,199



✓ Top-notch 720 projector.

VERDICT ★★★★★

✗ Not the quietest on the market.



TEACH YOUR OLD PHONE NEW TRICKS.

All we are saying is give perfectly good hardware a chance.

VoIP is the future. So step into it. Not by ripping and replacing, but by sticking with the here and now. It's possible because now moving to VoIP isn't about hardware. It's about software. Keep your hardware—your PABX, gateways, even your phones. Move to VoIP with software. Software that integrates with Active

Directory,* 2007 Microsoft® Office system, Microsoft Exchange Server, and your PABX. Maximise your current PABX and phone investment and make it all part of your new software-based VoIP solution from Microsoft. Your hardware is ready when you are. Learn more at microsoft.com.au/voip

VOIP AS YOU ARE.

Your potential. Our passion.™
Microsoft

Inside Telephone 2.0

VoIP-based communications are making traditional phone systems obsolete. In this VoIP for business primer, APC explains the business benefits of VoIP and unified communications.

Voice over IP (VoIP) has always been a way to get cheaper phone calls. After years of steady lobbying by its advocates, however, the business community has now warmed to VoIP enough that it has become the first port of call for companies with aging telephony infrastructure – and a decidedly competitive advantage for those extending their VoIP across the business.

That's a long way to have come for a technology that was once dismissed as an Internet novelty. But with the availability of technologies like SIP (session initiation protocol) – now the lingua franca for getting phones, Web cams, PCs and other devices on speaking terms – and ever-faster broadband, VoIP has now become an almost unremarkable part of the business communications landscape.

What is remarkable about VoIP is the way that it's being used these days: as service providers explore new ways of tying VoIP services in with the rest of the IT infrastructure, their customers

are finding benefits from VoIP that go far beyond simple call savings.

Improved productivity, lower overheads, more flexibility and increasingly tight integration with other business applications are all changing the way knowledge workers handle their everyday jobs. Implemented properly, VoIP is a competitive advantage for businesses and – to use a cliché – not an end in itself, but a means to a completely new end.

NOT YOUR FATHER'S VOIP

That may seem like lofty ambitions for anyone who has used home VoIP services such as those from engine, Gotalk, ISPhone, Freshtel, MyNetFone, and others. Built around a basic VoIP ATA (analogue terminal adapter), such services sell themselves on price but can sometimes be let down by an inadequate broadband connection or sudden surges of activity by competing applications.

Many of those issues will be resolved as the rise of ADSL2+ increases average bandwidth across the country, and as ISPs refine their quality of service (QoS) capabilities to minimise call interruption from conflicting demands on the broadband connection.

Yet while a growing number of Australians are using such services at home, they're just an entrée for the main course that is being spread out for businesses of all sizes. This course is best described these days using the umbrella term 'unified communications' (UC), which is vendor-speak for the combination of VoIP, videoconferencing, email, instant messaging, presence awareness, and other applications.

You can, the theory goes, use UC to find and communicate with anybody, anywhere, using whatever method of communications makes sense at the time. Throw these services into the

stockpot and out comes a savoury melange that is proving to be an incredibly useful way to help employees get on with the business of, well, business.

In a UC setup, for example, you might embed a link that lets customers start an IM session with a customer service representative. If the customer is a slow typist, the rep could suggest switching the session to a voice conversation – and kick off that session with the click of a button.

More complicated UC setups will embed this sort of functionality into business applications such as SAP and Oracle. If an accounts payable clerk had a question about a submitted invoice, for example, she could just click a link embedded into a data entry form; the UC environment would pull the person's contact details from the company's customer database, then automatically dial the customer's office number. If the office number was unanswered, the accounts payable system could automatically pull the person's mobile number from the database and try that approach – or it could just be set to leave a generic voicemail message on the customer's phone.

Third-party solutions to tie together these various streams of communication have been around for a little while, but the UC market has failed to gain critical mass due to the lack of consistent platforms and interfaces between systems. Enter Microsoft, whose nearly ubiquitous Exchange email system and Windows Messenger IM applications came together at the October launch of Office Communications Server (OCS).

A TOTAL SOLUTION

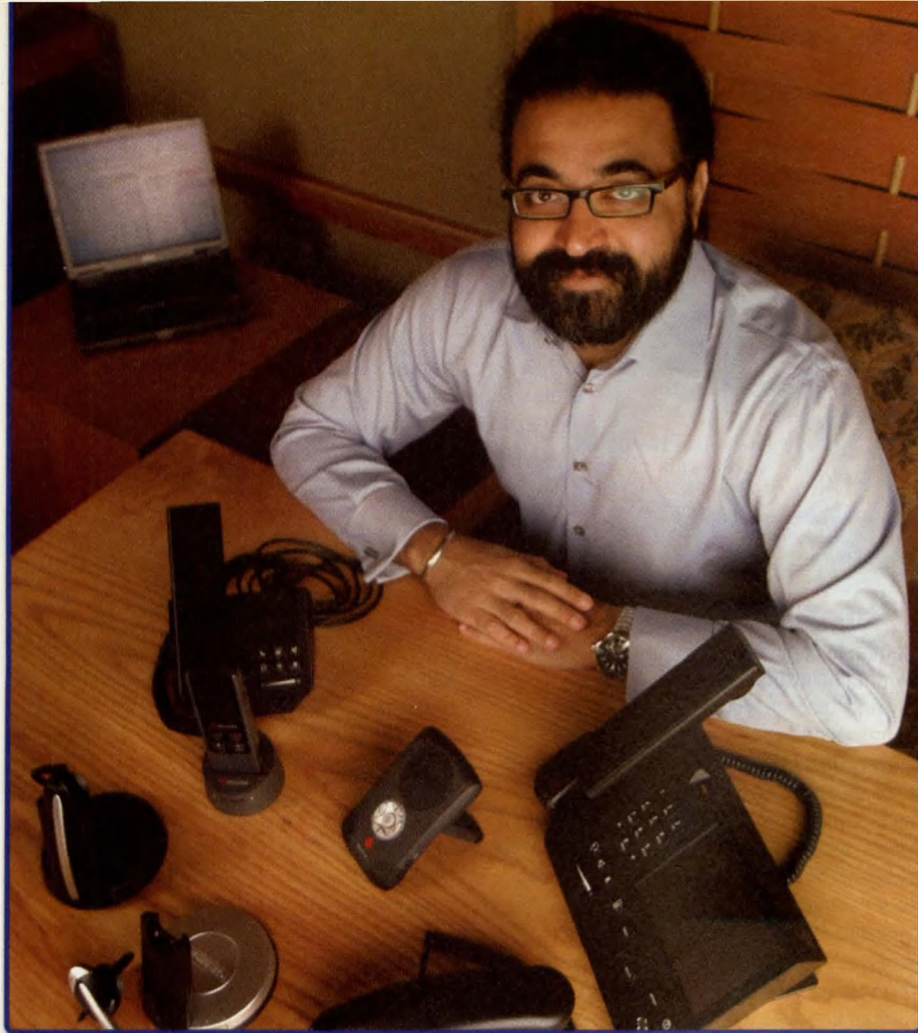
OCS is all about integration, combining the communications capabilities of VoIP with the



Oscar Trimboli, director of unified communications with Microsoft Australia

DON'T RIP AND

IT'S A SOFTWARE-BASI



Gurdeep Singh Pall, Corporate Vice President of the Unified Communications Group, highlights a selection of new Unified Communications devices announced by Microsoft and nine industry-leading companies.

presence information in its IM system to provide a system that can not only find out where a person is, but allows the caller to reach them in a variety of ways. OCS features are available to any desktop, laptop, mobile phone or Web user able to access Microsoft's Office Communicator 2007 application.

Most important, however, is that Microsoft developed OCS in close conjunction with three key PABX providers – Nortel, Ericsson and Mitel – who together have decades of experience in voice. This means OCS not only handles communications over data networks, but can tightly integrate with the features of both existing and future PABXes.

"We see the future of voice being software," says Oscar Trimboli, director of unified communications with Microsoft Australia. "A lot of vendors are deploying voice solutions that put voice in a silo and don't integrate it with line of business applications, and into the software people use every day. And, if you can learn Office, you can use Communicator."

Combining unified communication into the enterprise network is a major step forward, since it saves customers from having to settle for half-baked imitations of complex PABX features such as hunt groups, call forwarding, conferencing, and so on. Using OCS, VoIP services can basically follow the configuration of

REPLACE.

VoIP SOLUTION.

MAKE A GIANT LEAP FROM ONE SMALL STEP.

the PABX that's already in place.

That integration makes VoIP deeply relevant for any business contemplating a move to the technology.

Also improving its relevance is Microsoft's UC Specialisation

certification program, which at launch time

had seen 23 Australian system integrators

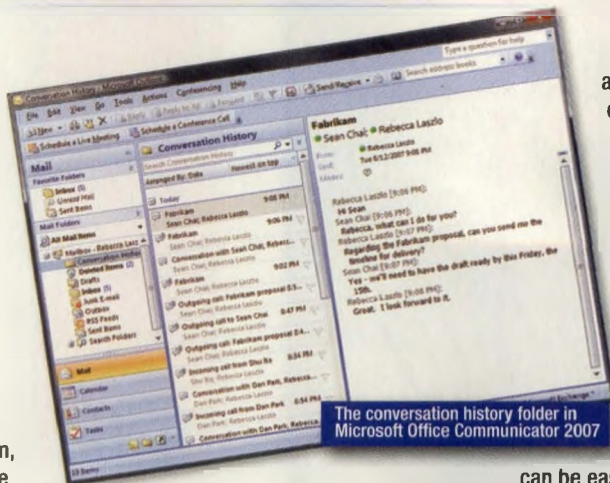
and 793 partners worldwide. This certification means systems integrators are being held to specific standards and capabilities – which should presumably make it easier for businesses to tease out the most relevant VoIP capabilities for their needs.

Microsoft isn't the only company delivering a UC vision; IBM, with its massive Lotus Notes customer base and its increasingly popular SameTime instant messaging and presence tool, is on the cusp of launching its Lotus SameTime Unified Telephony tool – which will mirror many of the features of OCS and simplify the process of building UC into company networks.

IBM, which carries more than 3.5 million SameTime messages per day between up to 350,000 users a day, doesn't yet have the desktop ubiquity enjoyed by Microsoft's Windows and Office. However, its solution – which has also been developed to provide tight integration with telephony systems from Nortel, Avaya, and the like – will appeal to those with an investment in Notes.

RAISE YOUR VOICE

As the linchpin of unified communications, a modern VoIP solution will enjoy a special place in the strategy of any business wanting to improve communications between employees



can be easily carried across IP networks – anything from the Internet, to company networks, to increasingly powerful handsets linked to the fast mobile networks that are slowly spreading across Australia's cities.

Skype, Office Communicator, and other VoIP applications run on both laptops and mobile handsets, as do VoIP applications from Nortel, Cisco, Avaya and other PABX vendors. The beauty of the latter applications is that they allow the mobile phone to become a seamless extension of the company network; this gives employees access to the same three-way calling, call forwarding, voicemail and other features they would be able to access at their office desk.

Basically, this means that if your office phone rings, so does your mobile – as long as you're within coverage of a mobile broadband network. This network may be one of the several 3G services now available in Australia, or it might – once next-generation phones become more common – be a WiFi connected service running over a high speed connection anywhere from your office to the local café.

PHONE OF THE FUTURE

With years of steadily growing adoption and unprecedented integration with business applications, VoIP – and the other IP-based forms of communication that are part of its ecosystem – is clearly here to stay. If your

and customers.

One of its most important capabilities, however, is the fact that because VoIP calls are built around IP, they

business is looking to replace an aging phone system, you owe it to yourself to explore your VoIP options; even if budget limitations mean you can't initially do much more than switch your phone calls to VoIP.

One option worth mentioning is hosted VoIP, a growing option that has service providers running PABX servers on their own premises. Customers using such a solution only need plug their IP handsets into the network, from which a router will carry calls to and from the service provider.

This model – pioneered in Australia by companies like Integ, MyNetFone, Mytel, AAPT and others – allows companies to taste the benefits of VoIP with a significantly reduced capital investment, compared with conventional telephony solutions. It's also cheaper in the long term, offers a more predictable cost model, offers new options for disaster recovery, is continuously updated and can scale right down to the smallest company.

BENEFITS OF VOIP

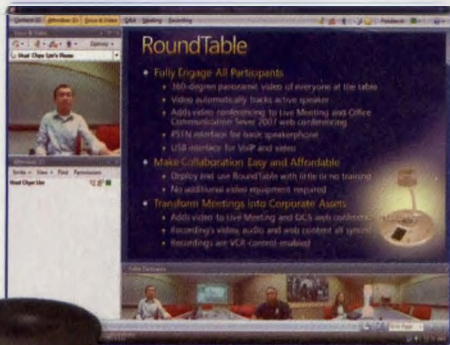
With all the hype around VoIP, it's easy to be sceptical about its benefits. But they are there. Here are VoIP's key benefits:

Call savings. Because carriers can push more IP calls over a given wire than they can conventional calls, VoIP calls are cheaper. If you're calling from one VoIP handset to another, calls are free – even between offices, states or to other countries.

Single network. Businesses that aren't using VoIP have two networks – one for voice and one for data. Each runs over its own wiring, requires differently skilled technicians to keep running smoothly, uses different equipment, and generally can't talk to the other. With VoIP, calls are carried alongside business data over a single converged network that's cheaper to install, run and manage.

Management benefits. Normal PABXes are big, bulky computers that require highly trained experts to reconfigure. That means the adding, moving or reconfiguring of a new employee's extension requires an expensive visit from a field

SAY HELLO WITHOUT SAYING GOOD



Microsoft Office Live Meeting integrates with Microsoft's Roundtable device (below, left) to provide a 360-degree panoramic video conference, visually bringing the active speaker to participants

technician. In a VoIP environment, adding a new user is as simple as plugging in a phone; the VoIP server takes care of the rest.

More flexible call forwarding.

Since VoIP calls are just normal Internet data streams, they can be routed to any device in the world that has an IP address.

That means desktop phones, mobile phones, WiFi phones, laptop computers, PDAs and even ordinary

Web pages can all receive phone calls.

Unified communications. If VoIP was all the rage a few years ago, attention is now shifting to unified communications – the act of combining VoIP, video, email, instant messaging, business applications and other types of communication into a single service. You've probably heard of receiving your voicemails in your email inbox, but unified communications takes this a step higher by integrating voice into every business function you can think of.

As with any technology, the full benefits of

VoIP become apparent the more you use it. If you roll out VoIP within your company, make sure you surround the rollout with an ongoing user interaction program so you can learn about the new uses your employees are finding for the technology. The odds are that VoIP – and the unified communications capabilities it has enabled – will change your business for the better.

INTEGRATING VOIP INTO YOUR BUSINESS

Getting VoIP into your company can be an expensive, tricky undertaking or it can be a lark; it all depends on the equipment, provider, and equipment structure you choose.

Talk to your current provider. If you already have a PABX – and you probably do – a good place to start on the road to VoIP is to talk with your current provider and see what migration path is offered.

Choose your components. Most VoIP environments use a dedicated call management server to route calls, handle voicemails, and so on. Vendors typically offer a huge range of options, ranging from interactive voice response to call recording and quality monitoring.

Keep your phones. Just because you're adopting IP doesn't mean you have to throw out all your old equipment. You may not get the fancy screens of flash new IP phones, but you can certainly get call and management savings by simply replacing your PABX.

Integrate where you can. Your basic VoIP environment will get you up and running with calls, but the biggest value comes when you tie its functionality in with your environment. You'll need to consider how and where this integration will happen, with business units like contact centres often requiring far more complex links than others.

Rethink your WAN. One of the biggest problems with VoIP is bandwidth – so you need to make sure your system has enough. Your LAN is probably fast enough – 100Mbps is a good benchmark – but your WAN may well be a bottleneck that's going to cause problems. Be sure you consider the potential limitations your network will impose before going full-bore with VoIP.

YOU ARE. VOIP AS YOU ARE.
microsoft.com.au/voip

VoIP

WAVE TO YOUR HARDWARE.

The most advanced interactive network display

Belkin's N1 Vision Wireless Router shows relevant network information on its interactive network LCD display. It's ideal for streaming video, music, and photos; online gaming; surfing the web; chatting with friends; and emailing.

Features:

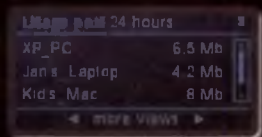
- Over 15 informational screens, plus additional screens planned in future firmware upgrades
- Plug-and-play "CD-less" setup
- 3x3 MIMO design for the fastest wireless speed and best coverage
- 802.11n draft 2.0-compliant
- 4 Gigabit ports



Broadband Download Speedometer
Monitor your download and upload speeds in realtime.



Network Status
Visual diagnostic of your network performance. Network problems and quick fixes for basic problems are displayed here.



Usage Past 24 hours
Monitor which connected devices have downloaded the most in the past 24 hours.



Guest Access Status
Let guests surf the internet on your network without them viewing your private files.



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RETRAVISION



No line rental: iiNet releases naked DSL

iiNet is offering ADSL2+ without the obligatory monthly line rental for the first time, reports *Dan Warne*.

It's the bane of broadband users: being forced to pay line rental for a phone line they barely use in the era of internet telephony and good-value capped mobile plans. Broadband ISP iiNet says it is close to releasing the solution: 'Naked DSL', which uses the phone line to deliver the high-speed broadband signal, but not the POTS (plain old telephone system) part.

It revealed that its entry-level naked DSL plan will cost \$44.95: 2GB of peak data and 2GB off-peak. Telephony will be done through iiNet's VoIP service (or a VoIP provider of the customer's choice). Another plan will cost \$64.95 with 10GB peak usage and 20GB off-peak. iiNet is expected to have the service on-sale by mid-November.

However, a source that asked not to be named said iiNet would follow the trend by BigPond and Optus

to charge for uploads as well as downloads, putting the brakes on unbridled P2P file sharing that has seen network utilisation rise exponentially for ISPs.

Other broadband providers are also investigating offering a naked DSL service. Internode and TPG are both looking at offering naked DSL but will likely launch after iiNet. Telstra has been forcing customers to pay line rental for phone services they didn't necessarily want ever since the introduction of DSL, even though the technical specification doesn't actually require a phone service.

The new naked DSL service will be delivered through "unconditioned local loop (ULL)", where the phone line is physically disconnected from Telstra's equipment and reconnected to the DSL ISP's equipment. The ISP pays Telstra a small fee each month to rent the physical copper wire to your house.

in brief

ADSL2+ IN MORE PLACES

Internode has announced 64 more exchanges will be enabled for ADSL2+ in a \$9-million plan. 18 exchanges have been switched on already, with another 46 added to the planned list (see the list at internode.on.net/dslams). Meanwhile, Telstra has agreed to switch on ADSL2+ in 211 exchanges where it had previously installed the equipment and left it to gather dust. It has only agreed to do so after receiving a government grant from the Australian Broadband Guarantee scheme.



ADSL2+ seems to finally be spreading across the nation.

TELSTRA NEXT G HITS 7.2MB/S

Telstra has released a set of hardware devices that can access its Next G network at 7.2Mbit/s down and 1Mbit/s upstream — roughly equivalent to an ADSL1 connection over the mobile network. Customers who bought cards and modems previously can get firmware upgrades that provide the enhanced download speed, but they won't get the faster upstream speed.

But if you'll be a frequent mobile internet user, go for the Telstra Mobile 3GB plan — at \$119/m, it's \$76 cheaper than the equivalent BigPond Wireless 3GB plan at \$194.95!

your monthly broadband guide

APC is proud to partner with the independent broadband price-monitoring service Broadband Choice (broadbandchoice.com.au) to bring you the best ADSL and cable deals.

The comparison table on the following pages focuses on internet service providers that best serve the majority of APC readers' needs — those that have national coverage (though we have included some ISPs that provide higher than 2Mb/s speed services in limited areas).

Only those meeting at least three of our four plan selection criteria are listed:

Budget plan: cheapest deal under \$35/month.

Light plan: cheapest deal under \$60/month, with at least 512Kb/s speed and 1GB data.

Family plan: largest download allowance under \$80/month, at least 512Kb/s and 10GB data.

High-speed: cheapest 1.5Mb/s plan under \$100/month, with 10GB data minimum.

If an ISP has "unlimited downloads" but speed is throttled after reaching a certain limit, the portion in which you can get full-speed downloads is listed as its limit.

APC has picked the lowest price for a contract period of six months or less for broadband installation. Otherwise, the lowest-priced option was selected.

The installation price doesn't include a modem because you may find you'll get better value by buying one separately.

Can't find your provider in our list? That's because some of the largest ISPs, and many smaller ones, didn't meet the selection criteria. There may be ISPs we didn't list that will provide better deals (but which only service your local area or state).

ISPs enter their own information into the Broadband Choice database. ISPs can contact bc@whirlpool.net.au for more details on how to become part of the database.

Data for our table was extracted from the Broadband Choice database on 29 October 2006.



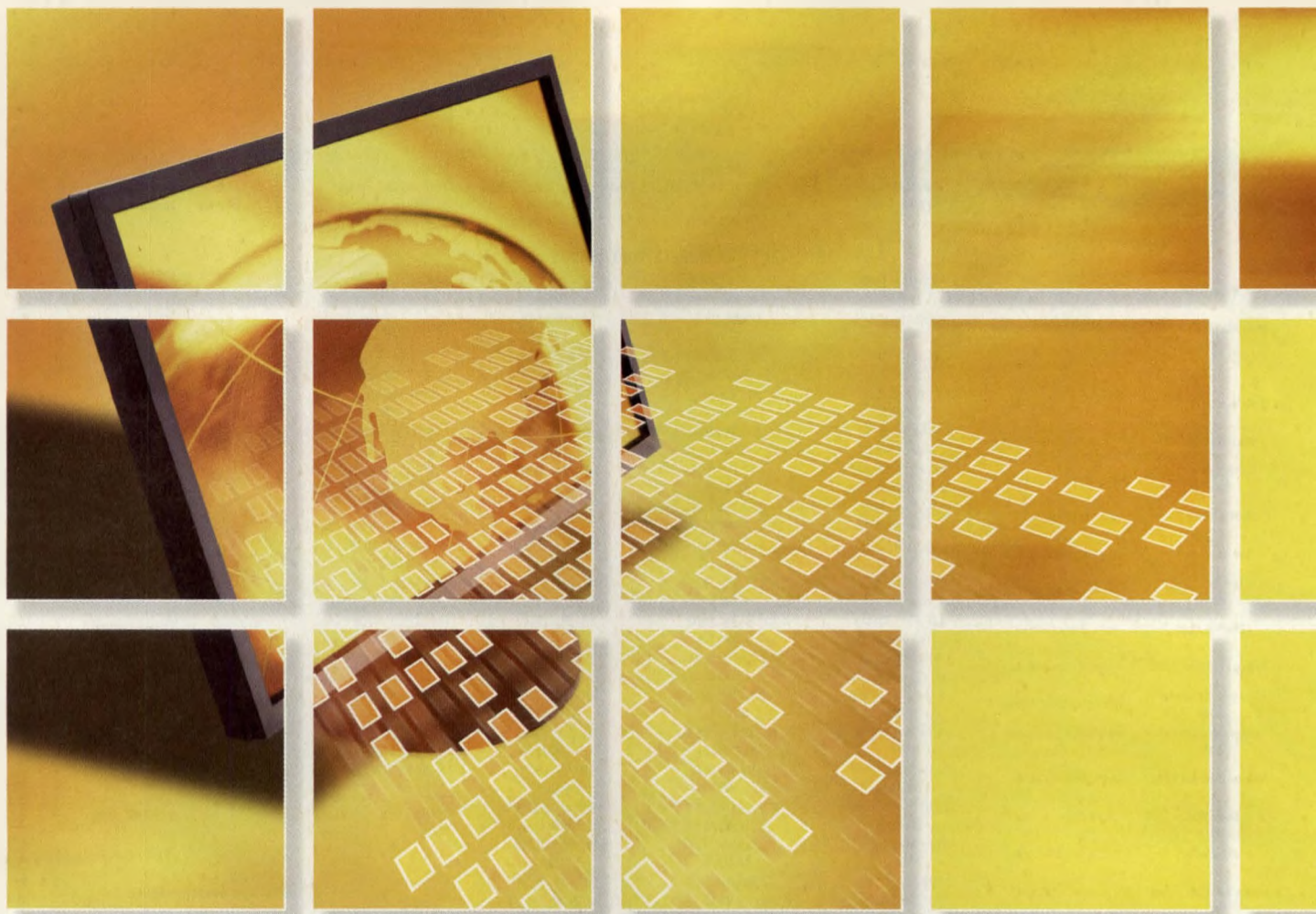
Name	Online	Budget plan (under \$35)	Light plan (under \$60, at least 512Kb/s, minimum 1GB data limit)	Family plan (under \$80, at least 512Kb/s, minimum 1GB data limit)	High speed plan (under \$100, at least 1.5Mb/s, minimum 1GB data limit)	National	Spam filtering	Setup fee and contract length	Regul transfer
Super-fast broadband ISPs (faster than 1.5Mb/s)									
aaNet ADSL2+	www.aanet.com.au	\$19.90†* 1GB+ 24Mb/s	\$39.90†* 8GB+ 24Mb/s	\$49.90†* 16GB+ 24Mb/s	\$79.90†* 32GB+ 24Mb/s	✗	✗	\$119 12mths	✗
AAPT LiveNet ADSL2+	http://home.aapt.com.au	\$29.95† 1GB^ 24Mb/s	\$39.95† 5GB^ 24Mb/s	\$59.95† 20GB^ 24Mb/s	N/A	✗	✓	\$100 1mth	✗
AuNix ADSL 2	www.aunix.com.au	N/A	\$44.95† 20GB+^ 24Mb/s	\$59.95† 30GB+^ 24Mb/s	\$59.95† 30GB+^ 24Mb/s	✓	✓	\$0 12mths	✓
BKB Home ADSL2+ Preferred	www.bkb.net.au	N/A	\$44.95† 10GB 24Mb/s	\$59.95† 40GB 24Mb/s	\$59.95† 40GB 24Mb/s	✗	✓	\$89.95 12mths	✗
BKB Home ADSL2+ Standard	www.bkb.net.au	N/A	\$59.95† 5GB 24Mb/s	\$69.95† 15GB 24Mb/s	\$99.95† 40GB 24Mb/s	✗	✓	\$89.95 12mths	✗
Blackstump ADSL2	www.blackstump.net.au	N/A	\$44.95† 20GB+ 2Mb/s	\$59.95† 30GB+ 4Mb/s	\$59.95† 30GB+ 4Mb/s	✓	✓	\$129.95 12mths	✓
Comcon ADSL2+	www.comcon.com.au	\$29.95†* 1GB+ 24Mb/s	\$39.95† 5GB+ 24Mb/s	\$69.95† 40GB 24Mb/s	\$69.95† 40GB 24Mb/s	✗	✓	\$50 12mths	✗
Comstech Systems ADSL2+	www.comstech.com.au	N/A	\$51.50† 5GB 24Mb/s	\$66.95† 25GB 24Mb/s	\$77.50† 50GB 24Mb/s	✓	✓	\$133.95 6mths	✓
Dodo Super Fast ADSL2+	www.dodo.com.au	\$9.99†* 1GB+^ 24Mb/s	\$29.99†* 5GB+^ 24Mb/s	\$49.99†* 15GB+^ 24Mb/s	N/A	✗	✗	\$1.90 129.99 1mth	✗
Dodo High Speed ADSL2+	www.dodo.com.au	\$29.99†* 1GB+^ 24Mb/s	\$39.99†* 5GB+^ 24Mb/s	\$59.99†* 15GB+^ 24Mb/s	N/A	✗	✗	\$1.90 129.99 1mth	✗
Empcom ADSL2+	www.empcom.net	N/A	\$59.95 20GB 24Mb/s	\$59.95 20GB 24Mb/s	\$89.95 40GB 24Mb/s	✗	✗	\$129 6mths	✗
EscapeNet ADSL Home	www.esc.net.au	\$29.90† 500MB 24Mb/s	\$39.90† 5GB 24Mb/s	\$59.90† 25GB 24Mb/s	\$89.90† 50GB 24Mb/s	✓	✓	\$99 6mths	✓
Green Tree Frog ADSL 2+ ULL	www.greentreefrog.net.au	\$29.95† 2GB 24Mb/s	\$39.60† 5GB 24Mb/s	\$66† 20GB 24Mb/s	\$99† 40GB 24Mb/s	✗	✓	\$165 12mths	✗
liNet broadband2+ ADSL (24Mb/s)	www.linnet.net.au	\$29.95† 500MB+ 24Mb/s	\$49.95† 7GB+ 24Mb/s	\$69.95† 20GB+ 24Mb/s	\$99.95† 40GB+ 24Mb/s	✗	✓	\$79.95 6mths	✗
ISP ADSL2+	http://w3.isp.net.au	N/A	\$36.30†* 16GB 24Mb/s	\$69.30†* 42GB 24Mb/s	\$69.30†* 42GB 24Mb/s	✗	✓	\$145.65 6mths	✗
Internode Extreme ADSL2+	www.internode.on.net	N/A	\$59.95 20GB 24Mb/s	\$59.95 20GB 24Mb/s	\$74.95 30GB 24Mb/s	✗	✓	\$129 6mths	✗
iSage ADSL 2	www.isage.net.au	N/A	\$44.95† 20GB+ 24Mb/s	\$59.95† 30GB+ 24Mb/s	\$59.95† 30GB+ 24Mb/s	✓	✓	\$0 12mths	✓
Koala Residential ADSL2+	www.koalatelecom.com.au	N/A	\$44.95† 5GB+ 24Mb/s	\$69.95† 20GB+ 24Mb/s	\$89.95† 30GB+ 24Mb/s	✓	✓	\$149.95 6mths	✗
Koala Usenet Dedicated	www.koalatelecom.com.au	N/A	\$49.95† 30GB 24Mb/s	\$59.95† 50GB 24Mb/s	\$49.95† 30GB 24Mb/s	✓	✓	\$149.95 6mths	✓
letsGo Go ADSL2+ 24Mbit	www.letsgo.com.au	N/A	\$39.95† 15GB 24Mb/s	\$59.95† 60GB 24Mb/s	\$59.95† 60GB 24Mb/s	✗	✓	\$99 12mths	✗
NetSpace Home ADSL2+	www.netspace.net.au	N/A	\$39† 5GB+ 24Mb/s	\$69† 20GB+ 24Mb/s	\$89† 30GB+ 24Mb/s	✗	✓	\$99 6mths	✗
NetSpace SOHO ADSL2+	www.netspace.net.au	N/A	\$49.95† 5GB 24Mb/s	\$59.95† 10GB 24Mb/s	\$99.95† 30GB 24Mb/s	✗	✓	\$99 6mths	✗
OptusNet Cable	http://personal.optus.com.au	N/A	\$59.99† 15GB^ 10Mb/s	\$59.99† 15GB^ 10Mb/s	\$99.99† 30GB^ 10Mb/s	✗	✓	\$89 12mths	✗
OptusNet DSL Direct	http://personal.optus.com.au	N/A	\$59.99† 15GB^ 24Mb/s	\$59.99† 15GB^ 24Mb/s	\$99.99† 30GB^ 24Mb/s	✗	✓	\$89 12mths	✗
PrimusNET up to 8000Kbps	www.primus.com.au	\$29.95† 1GB 8Mb/s	\$49.95† 5GB 8Mb/s	\$69.95† 20GB 8Mb/s	\$89.95† 40GB 8Mb/s	✗	✗	\$4 118 1mth	✗
PrimusNET ADSL2+	www.primus.com.au	\$29.95† 1GB+ 24Mb/s	\$49.95† 7GB+ 24Mb/s	\$69.95† 12GB+ 24Mb/s	N/A	✗	✗	\$4 12mths	✗
Soul ADSL2+	www.mysoul.com.au	\$34.95† 2GB+ 24Mb/s	\$44.95† 5GB+ 24Mb/s	\$69.95† 30GB+ 24Mb/s	\$69.95† 30GB+ 24Mb/s	✗	✓	\$119 12mths	✗
Spin ADSL2+	www.spin.net.au	\$29.95†* 1GB+ 24Mb/s	\$39.95† 5GB+ 24Mb/s	\$69.95† 40GB 24Mb/s	\$69.95† 40GB 24Mb/s	✗	✓	\$50 12mths	✗
SuperNerd ADSL2+	www.supernerd.com.au	\$20† 1GB 24Mb/s	\$30† 5GB 24Mb/s	\$70† 45GB 24Mb/s	\$60† 35GB 24Mb/s	✗	✓	\$55 12mths	✓
TPG Residential ADSL2+	www.tpg.com.au	\$29.99† 600MB 24Mb/s	\$49.99 18GB+ 24Mb/s	\$69.99 40GB+ 24Mb/s	\$99.99 30GB+ 24Mb/s	✗	✓	\$59.95 12mths	✗
Westnet Broadband2+	www.westnet.com.au	\$29.95†* 500MB 24Mb/s	\$49.95† 5GB+ 24Mb/s	\$69.95† 10GB+ 24Mb/s	N/A	✗	✗	\$0.83 139 12mths	✗

Regular broadband ISPs (1.5Mb/s or less)

Netcall ADSL (Bundled)	www.netcall.com.au	\$24.90†* 2GB+ 256Kb/s	\$44.90†* 16GB+ 1.5Mb/s	\$54.90†* 24GB+ 1.5Mb/s	\$84.90†* 32GB+ 8Mb/s	✓	✓	\$145 12mths	✓
Netcall ADSL (Unbundled)	www.netcall.com.au	\$29.90* 2GB+ 256Kb/s	\$49.90* 16GB+ 1.5Mb/s	\$59.90* 24GB+ 1.5Mb/s	\$89.90* 32GB+ 8Mb/s	✓	✓	\$145 12mths	✓
aaNet ADSL (Bundled)	www.aanet.com.au	\$24.90†* 2GB+ 256Kb/s	\$44.90†* 16GB+ 1.5Mb/s	\$54.90†* 24GB+ 1.5Mb/s	\$84.90†* 32GB+ 8Mb/s	✓	✗	\$145 12mths	✓
aaNet ADSL (Unbundled)	www.aanet.com.au	\$29.90* 2GB+ 256Kb/s	\$49.90* 16GB+ 1.5Mb/s	\$59.90* 24GB+ 1.5Mb/s	\$89.90* 32GB+ 8Mb/s	✓	✗	\$145 12mths	✓
AAPT Broadband	http://home.aapt.com.au	\$34.95† 1GB^ 256Kb/s	\$59.95† 15GB^ 1.5Mb/s	\$59.95† 15GB^ 1.5Mb/s	N/A	✓	✓	\$100 1mth	✓

Name	Online	Budget plan (under \$35)	Light plan (under \$60, at least 512Kb/s, minimum 1GB data limit)	Family plan (under \$80, at least 512Kb/s, minimum 1GB data limit)	High-speed plan (under \$100, at least 1.5Mb/s, minimum 1GB data limit)	Mailbox	Spam filtering	Setup fee and contract length	Speed booster
Regular broadband ISPs (1.5Mb/s or less)									
AuNix ADSL	www.aunix.com.au	\$29.95† 15GB 256Kb/s	\$59.95† 20GB+ 1.5Mb/s	\$59.95† 20GB+ 1.5Mb/s	\$74.95† 35GB 1.5Mb/s	✓	✓	\$99 6mths	✓
Australia On Line ADSL	www.australiaonline.net.au	\$29.95 1GB+ 256Kb/s	\$49.95 5GB 1.5Mb/s	\$64.95 10GB 1.5Mb/s	N/A	✓	✓	\$99 6mths	✓
Australis Internet ADSL	www.australis.net	\$34.95 1GB 256Kb/s	\$59.95 30GB+ 1.5Mb/s	\$59.95 30GB+ 1.5Mb/s	\$59.95 30GB+ 1.5Mb/s	✓	✓	\$139 1mth	✓
Beagle Internet ADSL	www.beagle.com.au	\$29.95 1GB 256Kb/s	\$56.95 5GB 1.5Mb/s	\$68.95 15GB 1.5Mb/s	\$79.95 50GB 1.5Mb/s	✓	✓	\$157 1mth	✓
Blackstump ADSL	www.blackstump.net.au	\$34.95 5GB 256Kb/s	\$57.95 5GB 1.5Mb/s	\$69.95 15GB 1.5Mb/s	\$79.95 No limit 1.5Mb/s	✓	✓	\$108 6mths	✓
Blackstump ADSL Bundles	www.blackstump.net.au	\$34.95† 500MB 512Kb/s	\$47.95† 5GB 1.5Mb/s	\$69.95† 15GB 1.5Mb/s	\$79.95† No limit 1.5Mb/s	✓	✓	\$108 6mths	✓
BBI Flat Rate DSL	www.brownbear.net.au	\$32.95 2GB 256Kb/s	\$56.95 5GB 1.5Mb/s	\$69.95 25GB 1.5Mb/s	\$79.95 35GB 1.5Mb/s	✓	✓	\$119 6mths	✓
BBI Excess DSL	www.brownbear.net.au	\$32.95* 2GB 256Kb/s	\$56.95* 5GB 1.5Mb/s	\$69.95* 25GB 1.5Mb/s	\$79.95* 35GB 1.5Mb/s	✓	✓	\$119 6mths	✓
Brown Bear DSL/Phone	www.brownbear.net.au	\$19.95† 1GB 256Kb/s	\$54.95† 5GB 1.5Mb/s	\$64.95† 25GB 1.5Mb/s	\$74.95† 35GB 1.5Mb/s	✓	✓	\$119 6mths	✓
Chariot ADSL	www.chariot.net.au	\$29.95* 500MB 256Kb/s	\$54.95 5GB 1.5Mb/s	\$69.95 25GB 1.5Mb/s	\$79.95 40GB 1.5Mb/s	✓	✓	\$110 6mths	✓
Comcon Internet ADSL	www.comcon.com.au	\$29.95† 10GB 256Kb/s	\$44.95† 5GB+ 1.5Mb/s	\$69.95† 20GB+ 1.5Mb/s	\$99.95† 30GB+ 1.5Mb/s	✓	✓	\$99 6mths	✓
Concept Networks ADSL	www.conceptual.net.au	\$29.95* 500MB 256Kb/s	\$59.95* 5GB 1.5Mb/s	\$69.95* 15GB 1.5Mb/s	\$89.95 30GB 1.5Mb/s	✓	✓	\$99 6mths	✓
dataoz Residential ADSL	www.dataozsolutions.com.au	\$29.95 500MB 256Kb/s	\$56.50* 10GB 1.5Mb/s	\$56.50* 10GB 1.5Mb/s	\$98.50* 50GB 1.5Mb/s	✓	✓	\$129.50 6mths	✓
Dinkum Internet ADSL	www.dinkum.net.au	\$34.95 1GB 256Kb/s	\$59.95 5GB 1.5Mb/s	\$69.95 15GB 1.5Mb/s	\$89.95 50GB 1.5Mb/s	✓	✓	\$129 6mths	✓
Dodo ADSL	www.dodo.com.au	\$19.99† 500MB+^ 256Kb/s	\$39.99† 5GB+^ 1.5Mb/s	\$59.99† 15GB+^ 1.5Mb/s	N/A	✓	\$1.90	\$129.99 1mth	✓
EFTel ADSL	http://w3.eftel.com	\$19.95† 500MB 256Kb/s	\$59.95† 7GB 1.5Mb/s	\$69.95† 25GB+ 1.5Mb/s	N/A	✓	✓	\$125 12mths	✓
EscapeNet ADSL Home	www.esc.net.au	\$29.90 500MB 256Kb/s	\$39.90† 5GB 24Mb/s	\$59.90† 25GB 24Mb/s	\$89.90† 50GB 24Mb/s	✓	✓	\$99 6mths	✓
eTelecom ADSL	www.elecom.com.au	\$29.95† 1GB 256Kb/s	\$59.95† 5GB 1.5Mb/s	\$69.95† 15GB 1.5Mb/s	N/A	✓	✓	\$99 12mths	✓
ISP ADSL	http://w3.isp.net.au	\$33* 3GB 256Kb/s	N/A	\$69.30* 25GB 1.5Mb/s	\$88* 30GB 8Mb/s	✓	✓	\$132 6mths	✓
Internode Home ADSL	www.internode.on.net	N/A	\$49.95 5GB 1.5Mb/s	\$69.95 20GB 1.5Mb/s	\$84.95 30GB 1.5Mb/s	✓	✓	\$129 6mths	✓
iSage Internet ADSL	www.isage.net.au	\$34.95 15GB+ 256Kb/s	\$59.95† 20GB+ 1.5Mb/s	\$59.95† 20GB+ 1.5Mb/s	\$79.95 35GB+ 1.5Mb/s	✓	✓	\$99 6mths	✓
ITEL ADSL	www.itel.net	\$29.95† 500MB 256Kb/s	\$59.95† 5GB 1.5Mb/s	N/A	\$79.95† 60GB 1.5Mb/s	✓	✓	\$129 12mths	✓
Koala Residential ADSL1	www.koalatelecom.com.au	\$34.95† 2.5GB+ 256Kb/s	\$49.95† 5GB+ 1.5Mb/s	\$69.95† 15GB+ 1.5Mb/s	\$89.95† 30GB+ 1.5Mb/s	✓	✓	\$149.95 6mths	✓
Koala Business ADSL1	www.koalatelecom.com.au	\$34.95† 2GB+ 512Kb/s	\$49.95† 7GB+ 1.5Mb/s	\$59.95† 15GB+ 1.5Mb/s	\$79.95† 30GB+ 1.5Mb/s	✓	✓	\$149.95 6mths	✓
Lizzy ADSL	www.lizzy.com.au	\$29.95 1GB+ 256Kb/s	\$49.95 5GB 1.5Mb/s	\$64.95 10GB 1.5Mb/s	N/A	✓	✓	\$99 6mths	✓
Netspace Home ADSL	www.netspace.net.au	\$29.95† 10GB+ 256Kb/s	\$39.95† 5GB+ 1.5Mb/s	\$69.95† 20GB+ 1.5Mb/s	\$99.95† 30GB+ 1.5Mb/s	✓	✓	\$99 6mths	✓
NetSpeed ADSL	www.netspeed.com.au	\$29.95† 1GB+ 256Kb/s	\$54.95† 5GB+ 1.5Mb/s	\$64† 10GB+ 1.5Mb/s	N/A	✓	\$2	\$139 12mths	✓
Pacific Internet DSL	www.pacific.net.au	\$29.95† 3GB 256Kb/s	\$49.95 5GB 1.5Mb/s	\$49.95† 10GB 1.5Mb/s	N/A	✓	✓	\$99 6mths	✓
Primus Flexible Broadband	www.primus.com.au	\$24.95† 500MB 256Kb/s	\$54.95† 5GB 1.5Mb/s	\$69.95† 20GB 1.5Mb/s	N/A	✓	\$4	\$118 1mth	✓
Rabbit Internet ADSL	http://rabbit.com.au	\$28.95† 500MB 256Kb/s	\$58† 5GB 1.5Mb/s	\$70† 30GB 1.5Mb/s	\$70† 30GB 1.5Mb/s	✓	✓	\$104.50 6mths	✓
Soul ADSL	www.mysoul.com.au	\$29.95 No limit 256Kb/s	\$59.95† 10GB+ 1.5Mb/s	\$59.95† 10GB+ 1.5Mb/s	N/A	✓	✓	\$119 12mths	✓
Spin Internet	www.spin.net.au	\$29.95† 10GB 256Kb/s	\$44.95† 5GB+ 1.5Mb/s	\$69.95† 20GB+ 1.5Mb/s	\$99.95† 30GB+ 1.5Mb/s	✓	✓	\$99 6mths	✓
SuperNerd SuperDSL	www.supernerd.com.au	\$26.95 1GB 256Kb/s	\$59.95 15GB 1.5Mb/s	\$59.95 15GB 1.5Mb/s	\$72.95 30GB 1.5Mb/s	✓	✓	\$115 6mths	✓
TalkTODAY ADSL	www.talktoday.com.au	\$29.95† 500MB^ 256Kb/s	\$54.95† 5GB^ 1.5Mb/s	\$69.95† 30GB^ 1.5Mb/s	\$69.95† 30GB^ 1.5Mb/s	✓	✓	\$119 6mths	✓
TSN Broadband	www.tsnet.net.com.au	N/A	\$49.95 5GB 1.5Mb/s	\$69.95 20GB 1.5Mb/s	\$99.95 40GB 1.5Mb/s	✓	✓	\$129 6mths	✓
Water Sprite ADSL1 Shaped plans	www.watersprite.net.au	\$35 2GB 256Kb/s	\$60 5GB 1.5Mb/s	\$70 15GB 1.5Mb/s	\$84 35GB 1.5Mb/s	✓	✓	\$150 6mths	✓
Water Sprite ADSL1 Excess charged plans	www.watersprite.net.au	\$35* 2GB 256Kb/s	\$60* 5GB 1.5Mb/s	\$70* 15GB 1.5Mb/s	\$84* 35GB 1.5Mb/s	✓	✓	\$150 6mths	✓
Westnet Broadband1	www.westnet.com.au	\$29.95† 500MB 256Kb/s	\$59.95† 10GB+ 1.5Mb/s	\$69.95† 20GB+ 1.5Mb/s	\$99.95† 40GB+ 1.5Mb/s	✓	\$0.83	\$99 6mths	✓

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Software gets set to replace hardware

Dedicated components may soon be redundant, with the only electronic circuitry being that on which we run our software very, very fast. Mike Bedford investigates.

The first electronic device was invented 100 years ago, and soon after Western society was awash with radios, followed closely by television sets. The first computers were thought of as merely sophisticated calculators, but, with the introduction of the microprocessor, things would never be the same again.

The microchip replaced ordinary electronic circuitry and soon found its way into anything and everything from home entertainment equipment and cars to washing machines and even pets. Since then, a debate has raged

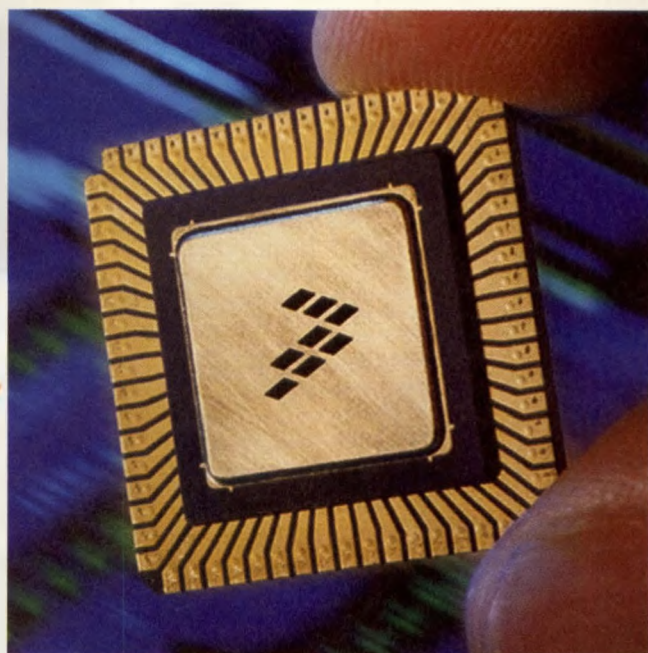
among engineers about which things are best done in software and which are best left to the hardware. But recently, the dividing line has increasingly moved in favour of software, so, one might ask, does this spell the end for dedicated components?

With a top-of-the-range Core 2 Extreme being quite expensive, the fact that you can actually buy a processor cheaply will be an eye-opener for some. Yet, these tiny 8-bit microcontrollers are responsible, to a large extent, for the seismic shift in the computing industry from hardware to software. After all, a

microcontroller is able to do the job of dozens of conventional electronic parts that would usually cost far more. Not only that, but shifting functionality to software gives so much more flexibility and the option of changing the design just by uploading some new code.

However, the introduction of low-cost microcontrollers clearly didn't immediately render all hardware obsolete. In the past, it's always been recognised that some things are better done in hardware while others are better done in software, and this is something that's still true today for two main reasons.

Cheap as chips: a low-cost microcontroller from semiconductor manufacturer Freescale.



First of all, hardware is fast and software is slow. Okay, so if you've recently bought a top-end PC you might not like to think of it as executing software slowly, but don't forget that a low-cost microcontroller might have a clock speed of a few megahertz — that's a thousand times slower than the processor in a desktop computer. Plus, there's the fact that it executes instructions sequentially; that's just one at a time. Even the cheapest of electronic components are able to work at much higher frequencies, and circuits aren't limited to sequential operation.

Second, some things are inherently analogue and always will be, simply because we live in a world of analogue values and have analogue senses. Although most audio equipment stores and manipulates sound digitally, software would seem to have no place in those elements that interact with the real world, namely microphones and speakers.

Yet even in these areas, software continues in its relentless march and the status quo is being overturned, as we're about to see.

SOFTWARE RADIOS

One of the last refuges of hardware has been radio frequency (RF) engineering. And with RF techniques forming the mainstay of wireless networking, mobile telephony, and home automation, as well as conventional areas such

as radio and TV broadcasting, this is now a major growth area.

It's easy to understand why this is the case, because every type of radio transmission currently relies on different hardware. Just imagine if it was all controlled by one chip, with software engineering the different modulations required for each technology. The power and space-saving potential would be enormous.

Dominic Banham, systems architect with RadioScape, explains how a software approach differs from the conventional method of

to digitise the incoming signal after it has undergone preliminary frequency-conversion and filtering."

So why is there a hardware down-converter? Can't it all be done in software? "In general, the transmitted frequency is likely to be too high to be directly digitised by an ADC," Banham says. "Also, real-world radio systems must cope with interfering signals, some of which can be at very high levels. To adequately cope with this would place severe demands on the dynamic range of the ADC. Another problem is that the necessary

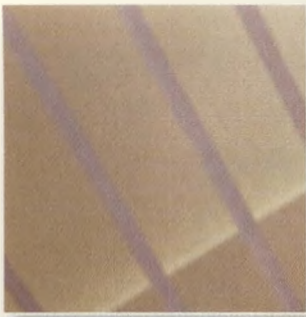


IN THE PAST, IT'S BEEN RECOGNISED SOME THINGS ARE BETTER DONE IN HARDWARE WHILE OTHERS ARE BETTER IN SOFTWARE

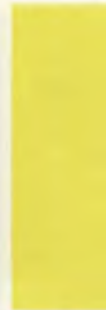
designing a radio receiver. "An SDR differs from a conventional radio receiver in the way in which the signal is demodulated. In a conventional receiver, the incoming signal is amplified, filtered (to select a single signal) and down-converted to a frequency at which the final demodulation takes place. In an SDR, the demodulation, and often the later stages of frequency conversion and filtering, are performed by software-based algorithms running on a DSP or other high-speed processor. A fast ADC is used

sampling rate to cope with the whole wanted band may be too high for the ADC and processor system to cope with."

So, what are the advantages of SDR? "Flexibility, simplicity and predictability," says Banham. "Flexibility, as the processor can be reprogrammed to cope with different modulation schemes without any hardware changes. Simplicity, as less RF hardware is needed, and the digital hardware is highly integrated. Predictability, because the characteristics of the digital processing won't



▶ Radioscape's SDR module now features in a wide range of radios from various manufacturers.



drift with time, temperature or supply voltage, and will be identical from unit to unit."

So, are we approaching a time when it can all be done in software? "The speeds of processors and ADCs are improving all the time," explains Banham, "and it's already possible in some cases to make an SDR in which the RF signal is digitised directly. For instance, it's possible to make a radio that covers the shortwave band (up to 30MHz) using a 16-bit ADC, sampling at a little over 60MHz. As technology advances, the range of frequencies over which this is possible will continue to increase.

"Having said that, such an approach is unlikely to be the optimum in terms of cost and power. Analog RF down-conversion technology is highly integrated, and, in conjunction with downstream SDR processing, is likely to prove the most economical solution."



SO, ARE WE APPROACHING A TIME WHEN IT CAN ALL BE DONE IN SOFTWARE?

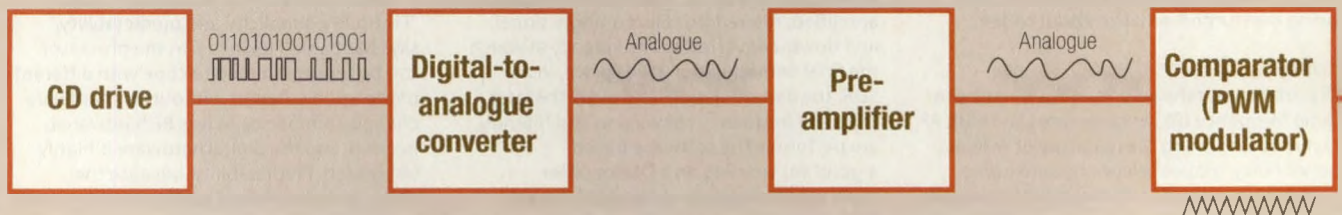
CLASS D AMPLIFIERS

Digital signals are stored and processed at the low signal levels used in digital electronic circuitry and microprocessors. This reduces power consumption, but, in the case of music reproduction, it means that those signals are not nearly powerful enough to drive a loudspeaker.

The usual solution is first to convert the digital values into an analog signal using a digital-to-analogue converter (DAC) and then to amplify it using an analogue amplifier. But times are changing in this field. Traditionally, a great deal of effort has gone into designing audio

amplifiers that are linear, which means that the output will follow the input accurately, resulting in no distortion. In practice, however, this is impossible and attempts to do so result in complicated amplifiers with a high component count and poor electrical efficiency.

A so-called Class D amplifier is exactly the opposite — it's extremely non-linear, but it consumes less power due to its greater efficiency. Being so non-linear, Class D amplifiers are totally inappropriate for amplifying analogue signals, but they're ideal for amplifying a square wave such as a digital signal.



In an SDR, the radio signal is demodulated using software algorithms.



Amplifying the zeros and ones of a digital data stream would normally be a useless exercise, because digital data can't be fed into a conventional speaker, but it could amplify a pulse width modulated (PWM) signal.

A PWM signal is a square wave in which the width of each pulse represents the amplitude of the analogue signal at a point in time. It's usually generated using an analogue circuit called a comparator that takes the analogue signal as one of its inputs and a high-frequency triangular wave as its other.

From this point on, the signal is a square wave and can be amplified using a Class D amplifier with little distortion. The output of the amplifier is fed through a filter that converts the PWM signal to a familiar audio signal that drives the speaker. The stages of a Class D amplifier, together with the pre-amplifier that would come before it (which provides volume and

tone controls) and the CD player before that, are shown below.

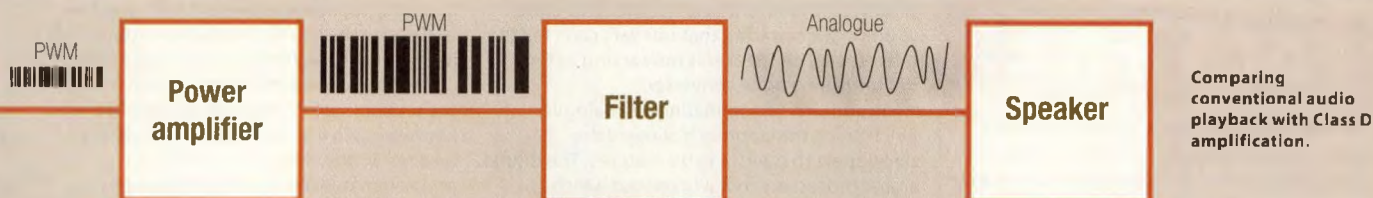
In itself, a Class D amplifier doesn't use software but it does pave the way for yet another development that could replace hardware by software, as Dave Brotton, technical marketing manager for Audio Products with Zetex Semiconductor, explains: "If you develop a digital input Class D amplifier then it opens up the possibility of replacing more circuitry by software: mixing, equalisation

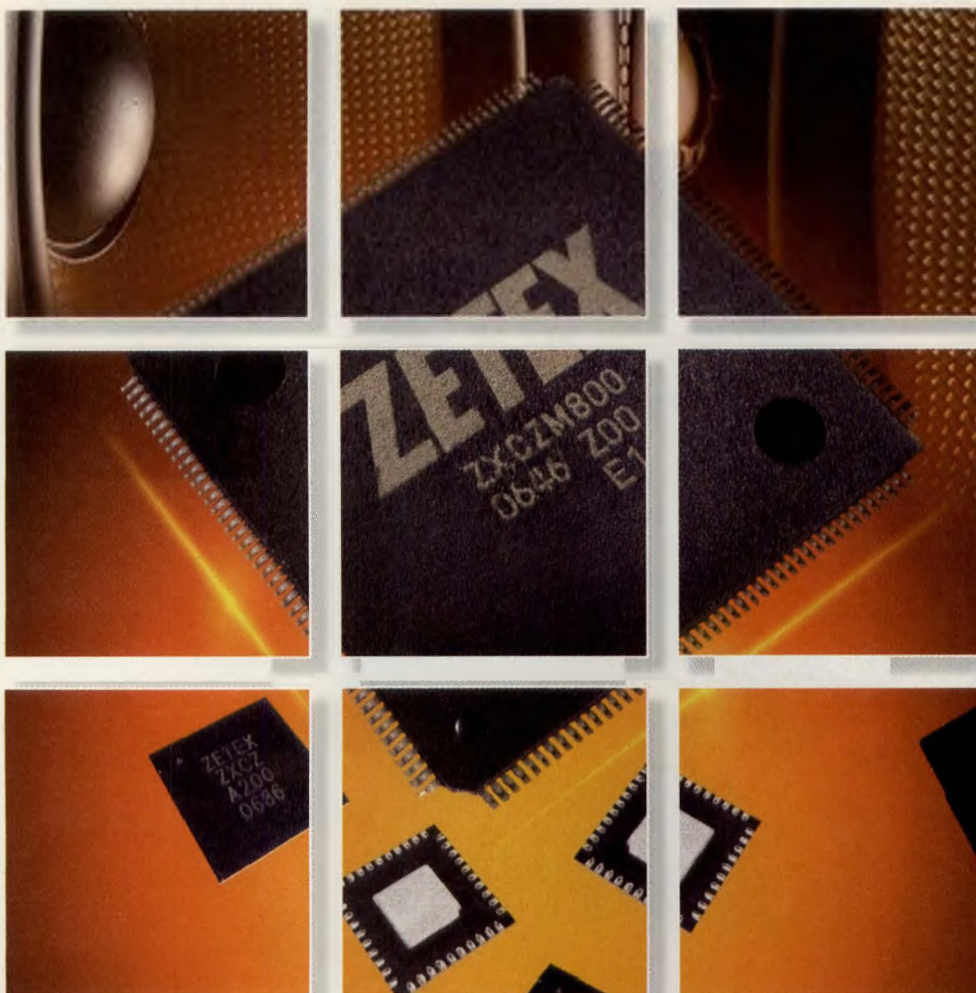
or volume controls, for example. Our Direct Digital Feedback Amplifier (DDFA) chipset is an example of a digital input Class D amplifier. The first DDFA chipset comprises two chips — one chip is a feedback processor for the power amplifier; the other provides the equivalent of DAC, pre-amplifier and PWM modulator in one."

So what are the benefits of this approach? "When you see figures for the total harmonic distortion and the dynamic range of a Class D amplifier (which tell you a lot about how well the amplifier sounds), they are often quoted for just the power amplifier section," Brotton says. "When you add in other components these figures can only get worse. Our figures include the DAC, pre-amplifier, PWM modulator and the power amplifier, yet they're better than what many manufacturers quote for the power amplifier alone. The measured performance is

FACT FILE!

With cheap microprocessors available, it's not at all surprising that ordinary electronics circuitry has taken a back seat in recent years.





Zetex's Class D chipset paves the way for a fully digital audio amplifier.

Yamaha's flat-panel speakers, based on 1 Ltd's technology, use analogue actuators and software to provide surround sound.



exceptional — it also sounds as good as many of the best analogue amplifiers."

The chipset is digital and, while it contains a DSP (digital signal processor — a special type of microprocessor) section to perform the pre-amp functions in software, the PWM and feedback compensation have to be in silicon, particularly with the high switching speed and resolution required to ensure the audio performance.

DIGITAL LOUDSPEAKERS

Even if audio amplification continues to become ever more digital in its operation, it still presents an analogue signal to the loudspeaker. And surely there can be no alternative, since the job of a speaker is to produce those analogue vibrations in the air which our ears perceive as sound.

Yet even here there have been moves to produce a speaker that's entirely digital in its operation and which thereby eliminates even

more of the electronic circuitry that drives it in favour of software.

Lots of companies produce 'digital speakers', but this is usually a misnomer. Most digital speakers take a digital input that is then converted to an analogue signal using a DAC and amplified before passing it to a conventional speaker. The only difference between this and a system with ordinary analogue speakers is that the conversion and amplification takes place inside the speaker cabinet, not inside the CD player and amplifier.

A few years ago a British company called 1 Ltd developed a true digital speaker that used digital signals to drive digital actuators. In an analogue speaker the electrical signals cause drive units to move back and forth, mimicking the analogue signal and causing vibrations in the air that we recognise as music.

The digital actuators of 1 Ltd's speaker also move the air backwards and forwards, but in discrete steps which, when added together, produce vibrations that are sufficiently close to analogue sound so that our ears can't tell the difference. The speaker is now acting as the digital-to-analogue converter.

In addition to eliminating all analogue electronics, this approach allowed the developers to build in extra features. The digital signal processors that worked out which actuator to pulse at each point in time also

allowed the single flat-panel speaker to replace the six speakers of a 5:1 surround-sound system by bouncing sound off the room's walls and ceiling so that it reached the listener's ears from left, right, front, back and centre. Exactly what benefits the digital approach provides in terms of sound quality, though, isn't hugely clear. It's interesting to note that 1 Ltd have now moved on to using a panel with multiple analogue actuators — again to provide surround sound — and the company declined to answer our questions on the pros and cons of the different digital and analogue approaches.

SOFTWARE TRICKS FOR HARDWARE

Software might be giving hardware a good thrashing, but it's also providing it with a lifeline. By adopting some of the tricks of the trade from the world of software engineering, hardware is being given a new lease of life.

Perhaps one of the major areas in which the technology of software has migrated to hardware is in the realm of programmable devices. To the software engineer, a programmable device is the RAM or flash memory that holds the software for a

FACT FILE!

Software is even replacing hardware in areas which have, traditionally, been the sole domain of analog electronics — radio receivers and audio amplifiers, for example.



▲ Xilinx Field Programmable Gate Arrays (FPGAs) are hardware devices whose code can be reprogrammed.

microprocessor. But to the hardware designer, programmable devices — with such confusing names as PLDs, PALs, CPLDs and FPGAs — are quite different. These are chips containing lots of basic electronic building blocks that can be connected together by programming. If you want to know how an FPGA (one of the most common types of programmable hardware) works take a look at the 'Programmable

Hardware' boxout on page 73, but here we'll consider the benefits of this approach.

Hardware is set in concrete while software can be changed — right? Well wrong, actually, if you use programmable devices. Because the internal connections — and hence the functionality — is defined by programming, hardware suddenly gains many of the advantages of software but none of its

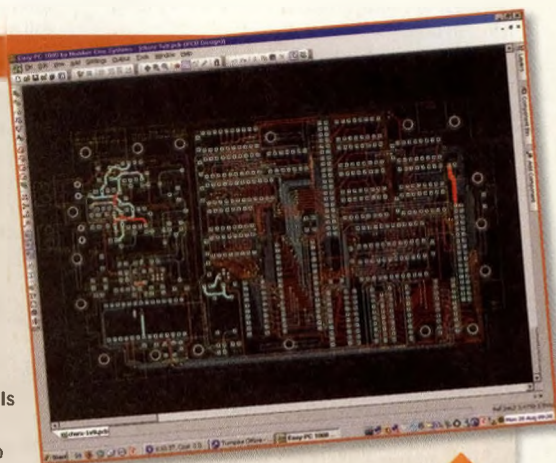
disadvantages. Here it's hardware that's fast, because it can contain many parallel signal paths, yet can be reprogrammed as requirements change. Some devices can be programmed just the once, so they provide benefits to the manufacturer; others are referred to as 'field programmable', which means that they can be reconfigured so the user can upgrade equipment via the web.

SOFTWARE DESIGNS HARDWARE

The decline in the use of electronics, and especially analogue electronics, might be dramatic — but not as dramatic as the decline in electronics design engineers. And with the supply of electronics graduates drying up in favour of software engineers, some academics have been investigating whether they can use software to design hardware.

Software assistance is well established. From circuit simulation packages that put a circuit through its paces before it's ever been built, to CAD packages that help in the layout of chips and circuit boards, software is an essential tool in any electronic design engineer's toolbox. Rather more understandable is software that attempts to design circuits from scratch using only a specification of the required operation as a starting point.

In pioneering work at Sussex University, Adrian Thomas has attempted this using genetic algorithms. To start with, a set of circuits is created by connecting components together at random, typically in an FPGA. These are evaluated, automatically, and the best ones are combined in various ways to produce a set of hybrid circuits. Again these are evaluated and the best go forward to influence the design of another generation of circuits. In time — and we could be talking about a lot of time — a circuit evolves that fulfils its objectives. But the strange thing is that the resulting circuit often bears no resemblance to anything ever designed by a human engineer, and has experts scratching their heads trying to figure out how they could possibly work.



▲ Using software to lay out circuit boards is common, but software may soon design circuits from scratch.

How **X-Fi** measures up

Although it represents the current pinnacle of PC sound cards, the X-Fi has always had signal conversion as a significant barrier to break through. The manufacturers, Creative, needed to use the highest-end electronics available to produce this range of cards, and you'll find the majority of its cost goes not into RAM or the custom DSP processor, but the converters on either end of the signal flow. Lower-end cards use lower-end components; you'll get a reduced signal-to-

noise ratio (and therefore a lower overall quality) on the cheaper cards in the X-Fi range. If you're lucky enough to have an external DAC (such as the kind found on many pre-amps) you can switch off the onboard DACs on the X-Fi. This obviously reduces its capability for self-amplification, but there are higher-end DACs than the modules included onboard, and if you're desperate for signal quality this could be a significant step.

DACS

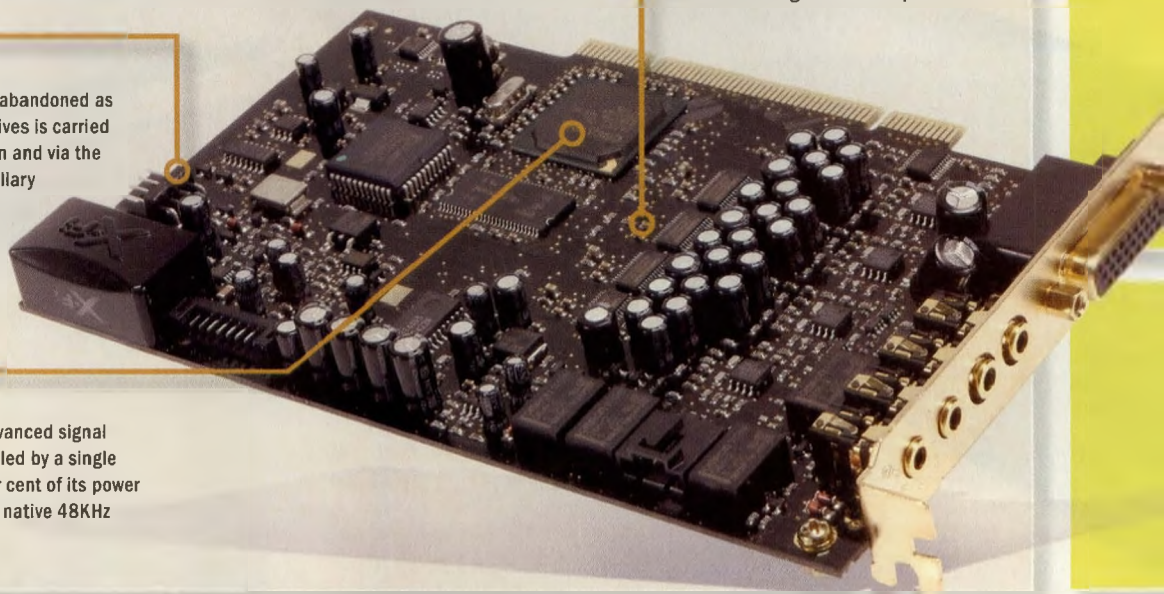
Because of its multichannel audio support, the X-Fi uses a string of four DACs. In the higher-priced Elite range, there are higher-end DACs, each totting a remarkable 116db noise reduction level; lower-end cards can only manage 106db. The higher-end DACs — which are produced by former PC sound card stalwart Cirrus Logic — have also been used in other high-end audio products.

ENDING CONNECTIONS

The internal line-ins have been abandoned as audio from your CD and DVD drives is carried digitally over the IDE connection and via the motherboard. An analogue auxiliary connector is all that's left.

DSP CHIP

The X-Fi incorporates highly advanced signal processing, all of which is handled by a single CPU-esque chip. Around 71 per cent of its power is used to convert signals to its native 48KHz sample rate.



Traditionally, the job of an electronic design engineer has been one of deciding which components are needed and how they should be connected together to produce a circuit with the necessary functionality, but it doesn't have to be that way. Although programmable devices such as FPGAs could be programmed by deciding manually which connections to make, for all but the simplest of circuits that would be a very long-winded task.

So, just as software engineers have, in the main, moved from programming individual processor instructions to using high-level programming languages, hardware engineers too are using something akin to software programming languages. These hardware description languages (HDL) free up the design engineer from thinking about the minutiae of the circuit and take a broader functional view with massive gains in productivity.

At first sight HDL code might look similar to code written in a conventional programming language such as C++, but there is one major difference. Programming languages intended for generating computer code work sequentially. Hardware, on the other hand, is much more parallel in its nature, so HDLs feature support for concurrency, thereby allowing multiple parallel processes that can execute independently of each other. What it

provides, therefore, is the convenience of software coupled with the speed of hardware.

HARDWARE'S FUTURE

Hand-designed hardware is being sidelined by the flexibility of software, and equipment such as radio receivers and loudspeakers, which have previously always been thought of as the domain of hardware, are now yielding to the software approach. Although hardware does still have some undeniable advantages, it is the tools of software engineering that are increasingly being used to overcome some of the drawbacks of hardware.

So what obstacles are currently preventing everything succumbing to the software approach? Will these obstacles ultimately be overcome and will this then mean the eventual end of hardware design? One man who's made it his job to answer these questions is Dr Greg

Horler, CEO of Instrumental Ltd and lecturer at the School of Electrical and Electronic Engineering at Leeds University.

"It could be argued that software has already conquered digital hardware design since designers can import microcontrollers into Field Programmable Gate Arrays (FPGAs) and connect them to achieve the desired functionality on vendor-supplied hardware," says Dr Horler. "Recently FPGA devices from Actel have caught up with microcontrollers by providing ADCs on chips, thus eliminating the need for an external ADC. The ultimate design package would be capable of compiling some description of a system, optimally, into an integrated mixed signal (analogue and digital) system-on-chip. This has been achieved to a degree in the digital domain but is in its infancy in the analogue domain, notwithstanding the availability of Field Programmable Analog Arrays, FPAAs."

At present, software appears to be in the ascendancy due to larger digital devices. However, engineers have always known that the difficulty lies in interfacing to an analogue world. Here, single-click software solutions will be much, much harder to achieve, so as long as there are applications that require creative and innovative solutions, probably in new implementation technologies, software alone will never predominate." **ETUC**

FACT FILE!

Software can't yet replace electronics in all areas because it doesn't have the speed advantage of hardware. But software engineering techniques are now being used in hardware design to provide the flexibility of software.

Increasingly, the PC is more a part of the design engineer's toolkit than the soldering iron.



PROGRAMMABLE HARDWARE

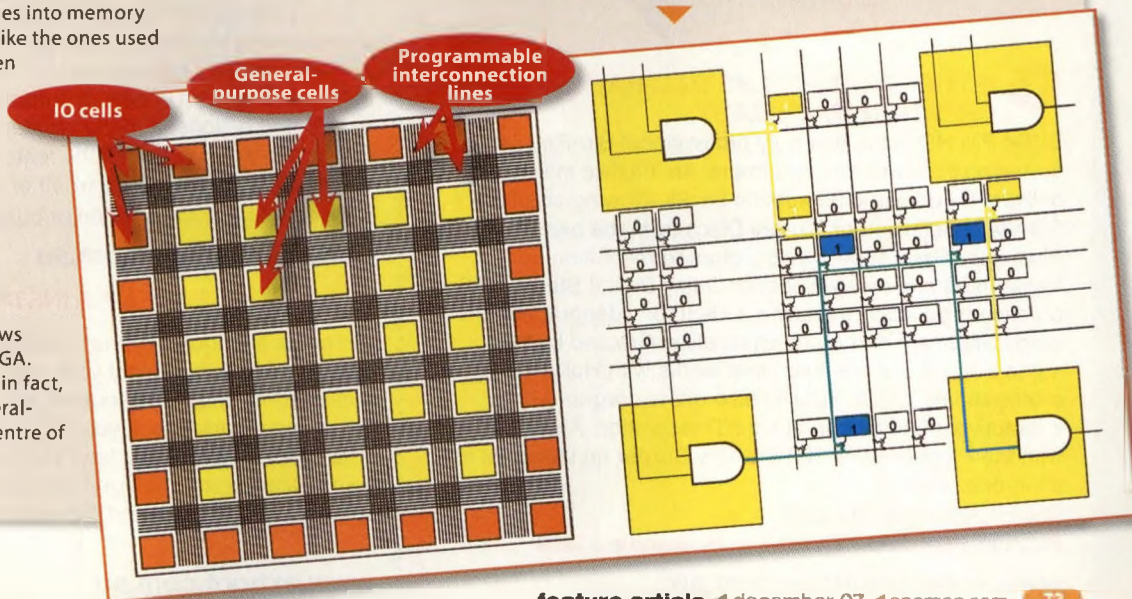
A Field Programmable Gate Array (FPGA) comprises an array of unconnected logic gates (for instance AND-gates and OR-gates), which are the basic building blocks of all digital circuits. Without being connected together the gates don't actually serve any purpose, so there's also an array of electronic switches. These are turned on or off by programming zeros and ones into memory cells, which are very much like the ones used in flash memory chips. When turned on, these electronic switches make connections between the logic gates, thereby configuring them to perform a specific task. So, reprogramming the chip changes its hardware configuration and hence its function.

The first illustration shows the basic structure of an FPGA. You'll notice that there are, in fact, two types of cells: the general-purpose logic cells in the centre of

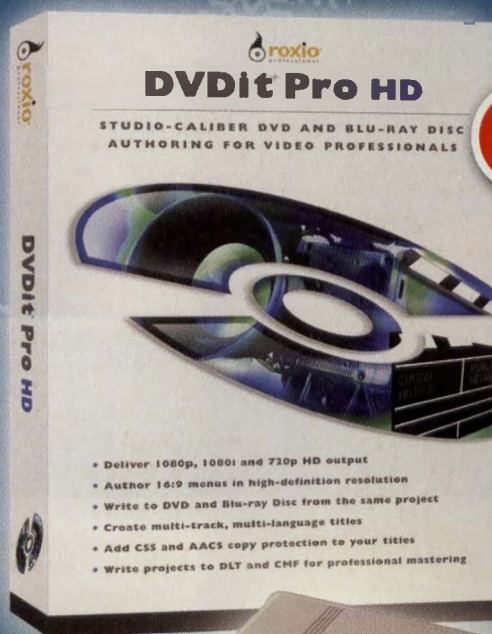
the chip and the I/O cells around the edge, which connect to the pins. In a real FPGA there would be far more cells, especially the general-purpose ones in the centre. The second diagram shows more details of a small portion of an FPGA and illustrates how connections are made by writing to the memory elements that control the electronic

switches. A couple of interconnections are shown as made – these are the ones indicated by coloured lines. The corresponding memory cells – the ones that contain 1s – have also been coloured.

The interconnections in an FPGA are re-configured by programming.



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1 ROXIO DVDIT PRO HD-BLU-RAY DISC CREATION MADE EASY

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Gift Guide



4 BENQ S32W

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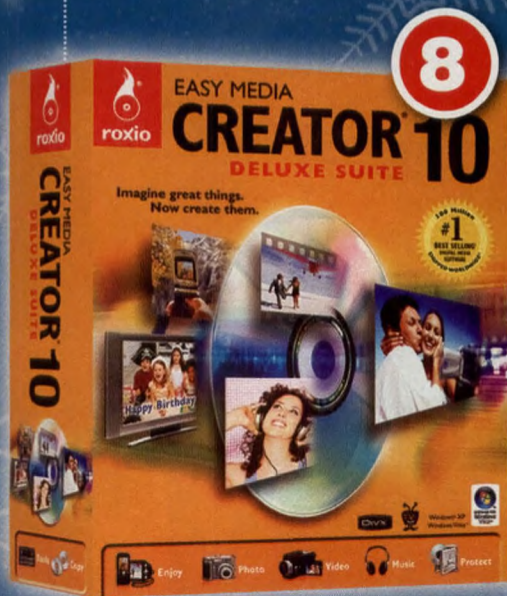
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8



9

7



7 MAXTOR ONE TOUCH 4

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Gift Guide

10



11



12



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Playing with Gibbons

Ubuntu's latest has finally arrived — does it fix the flaws discovered in the Open Source Challenge? Ashton Mills investigates.

Last issue I covered the joy of installing and setting up Compiz Fusion — which now is sported as one of the new features in the latest Ubuntu 7.10 'Gutsy Gibbon' release. But what else is new in Ubuntu's latest, and does it fix and improve upon the issues we encountered in the Open Source Challenge?

RATING GUTSY GIBBON

The original Open Source Challenge was a ten-part series looking at going cold turkey with Linux using Ubuntu as the operating system to do everything from working to gaming. For each task it was rated on a scale and, overall, fared pretty well. At the same time, I wasn't afraid to be blunt in the areas where it was a let-down and which need to be improved, especially with regards to it being an easy-to-use desktop experience. So with 7.10 just arrived, the question is, has it? Just as with the original challenge, I'll give Ubuntu 7.10 ratings, as compared to the previous release. There's a lot to cover so I'll keep it simple: either it's a GOOD improvement, or it still FAILS.

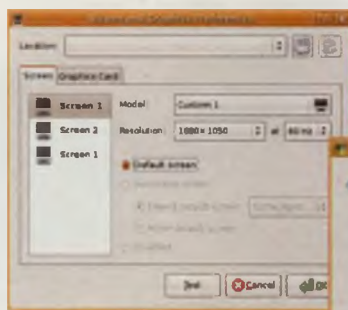
INSTALLATION AND SETUP

As usual, installation from the Live CD was just as easy as before, and the little bug with migration when there are no settings to migrate has gone.

Unfortunately, upon booting up, the old bugbear of the incorrect monitor resolution was still there — the resolution was set to 1,680 x 1,050 on this 1,920 x 1,200 monitor and, worse, bringing up the new (and apparently improved) Screen and Graphics preferences dialog, it still lacked the native resolution as an option, meaning the correct resolution can't be manually chosen. Not a good start.

Proper screen resolution: FAIL.

By default, new Compiz-Fusion wasn't enabled, as this requires a driver with OpenGL support, so the



Still no native resolution.

next step (and with the default driver failing to provide proper resolutions) was off to install the Nvidia driver.

Clicking System > Administration > Restricted drivers manager and selecting to install the official Nvidia drivers I had hoped would be a simple affair, but alas it was not. Instead of installing, Ubuntu reported that the software source for 'nvidia-glx-new' was not enabled. Fair enough, except it didn't give the option to automatically enable it, and it didn't even explain how to manually enable it. The only option is to click Close, and the drivers don't install.

Now if you're used to Ubuntu you know to then go to the Software Sources dialog and enable more repositories, but for a new user switching from Windows, they'd be stuck. And sure, some forum-searching might help them out but, as I've said before — if a user needs to search forums for an answer, the operating system isn't doing its job. Particularly, here it couldn't be more than a few hours work to update the Restricted

Enabling the official Nvidia drivers.



Drivers manager to automatically enable the repository (even for a single download) or explain to the user how to do it themselves.

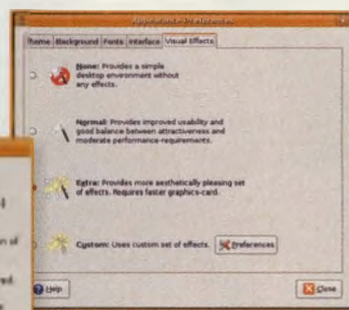
Installing Nvidia drivers: FAIL.

SECOND IMPRESSIONS

After heading to Software Sources, enabling all repositories, heading back to the Restricted Drivers manager and yet again trying to install the drivers, finally the operating system does what I'm asking it to do, followed by a necessary reboot.

And when I do, two magical things happen: firstly, the correct screen resolution of 1,920 x 1,200 is automatically selected, and Compiz-Fusion is automatically enabled. Nice.

As I covered last issue, there are many and varied swank effects with Compiz Fusion, and thankfully the Ubuntu team have done well not to



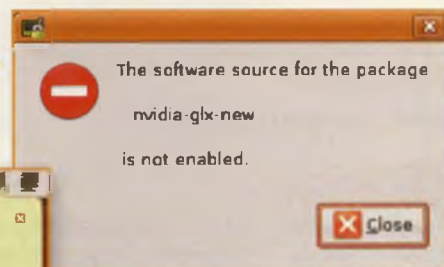
Easy configuration of Compiz Fusion options.

go over the top. The level of effects can be changed via System > Preferences > Appearance and selecting the Visual Effects tab. By default there are two levels of effects, and the stock 'Normal' settings tastefully selects just a few effects to improve the desktop experience without going to excess. Selecting 'Extra' enables more, but again it's not too much and adds just an extra bit of slick. Very well done.

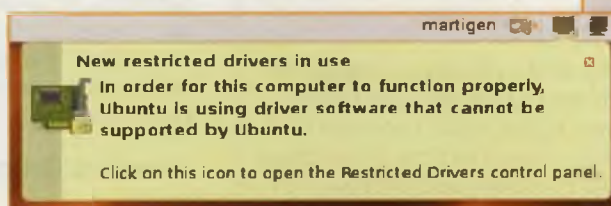
Desktop effects: GOOD.

For even more options you can manually install the Compiz Config manager 'ccsm' from Synaptic and get access to the full suite of Compiz Fusion desktop effects. When you do so, a fourth 'Custom' option will appear in the Visual Effects tab, and which can launch ccsd for you. In fact one of the nice features in Ubuntu 7.10 is this new

Tells you what you need, but not how to get it.



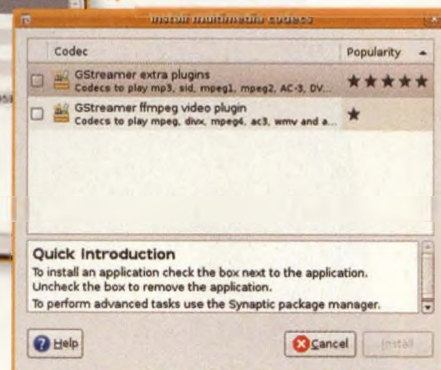
The official Nvidia drivers loaded.



The full suite of Compiz Fusion settings.



Totem prompts for necessary codecs.



Even phones are supported through applications like Wammu.



Appearances dialog, which now integrates themes, background image, fonts and basic user interface settings in the one place. **UI configurability:** GOOD.

Fast user switching is another prominent feature in this release, and while it does as it says on the tin, the tray applet has other benefits too — it brings to the forefront user properties, allowing the user to quickly edit their profile and, additionally, the login preferences via GDM. These options have always been there but are buried under the System > Administration menus.

Finally, searching has been updated with the use of Tracker. Tracker is great, working much like Apple's Spotlight and quietly indexing in the background. Tracker results are automatically included in the Deskbar applet's search results, or you can launch Tracker directly via Applications > Accessories. Options, including its system resources use, can be configured from System > Preferences > Indexing Preferences. **User switching and Search:** GOOD.

DEVICE SUPPORT

In the original challenge I found problems when plugging in devices like cameras. Using the same hardware, in 7.10 this now works as intended and seamlessly, with the transfer manager popping up and making it easy to browse and copy photos.

The iPod again worked fine with applications like Rhythmbox, and after installing the Wammu application from Synaptic I could even plug in my Nokia phone and get access to contacts, messages and more. Printer support for my Lexmark X5100 is non-existent again, though this is more the fault of Lexmark, as covered last time. However, in 7.10 a message now appears saying that this is the case. Overall, a great improvement. **Device support:** GOOD.

WEB BROWSING

Last time there were problems with Flash and Java with the 64-bit version of Ubuntu, and although enabled through a script found on the forums that allows the 32-bit plug-ins to work in the 64-bit Firefox, it's not the same as having Ubuntu do it for you. In Ubuntu

7.10, it now does exactly this after first prompting for which plug-ins the user wants to install. This is a much-improved change, and means the web-browsing experience can now be seamless. Additionally, a new 'Get Ubuntu Add-ons' can be found in the Firefox Add-ons menu, which lists a large range of Ubuntu supported plug-ins.

Web browsing: GOOD.

MEDIA PLAYBACK

So far so good, but what about the problematic media playback encountered last time? Attempting to play an MP3 Totem prompts to install the exact gstreamer plug-ins required, an improvement over 7.04. After installation, playing starts automatically.

MP3 playback: GOOD.

Last time DVD playback suffered a similar fate to MP3s, and with the favourable update, there I was hoping for the same for DVDs, but it was not to be. Putting in a DVD, Totem launched but playback didn't work and there was no prompting for codecs. Perhaps this was fair, as searching Synaptic for 'dvd' showed the required

gstreamer codecs were already installed (bundled up in the same packages that enabled MP3 playback). So why wasn't it working? Searching further in Synaptic reveals the 'Ubuntu restricted extras' package that claims to include support like Flash and DVD playback, but after installing this Totem would still sit silent when a DVD (many were tried, as well) was inserted.

Checking 'dmesg' in the console showed that the kernel was having a hard time accessing the DVD drive, with repetitive sense errors — note that this is the same drive Ubuntu 7.10 was installed from, and the same drive and DVDs that played back fine under Ubuntu 7.04. The new kernel would appear to be the culprit here. And, while this no doubt doesn't affect all systems, it affected mine, which is as valid a candidate for a user system as any other, and it was unable to get DVDs to play.

DVD playback: FAIL.

CONCLUSION

There are quite a few other subtle changes in Ubuntu 7.10 — the artwork for one, which includes new icons and a prettier background, the latest OpenOffice 2.3 release, a 2.6.22-based kernel of course, and write support via NTFS-3g for NTFS partitions among others.

Overall, going by Open Source Challenge standards, Ubuntu 7.10 is a nice improvement over the previous release, and some of the issues raised then have been fixed, though not all. It's definitely getting there — here's hoping the next release sees these remaining bugbears ironed out. **BTIC**

Auto-detection and copying images works flawlessly.



Missing printer driver
'X5100_Series' has been added, using the 'Generic text-only printer' driver.

Find driver

Still no luck with this printer, but the dialog is much more informative.

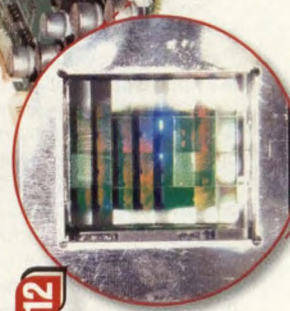
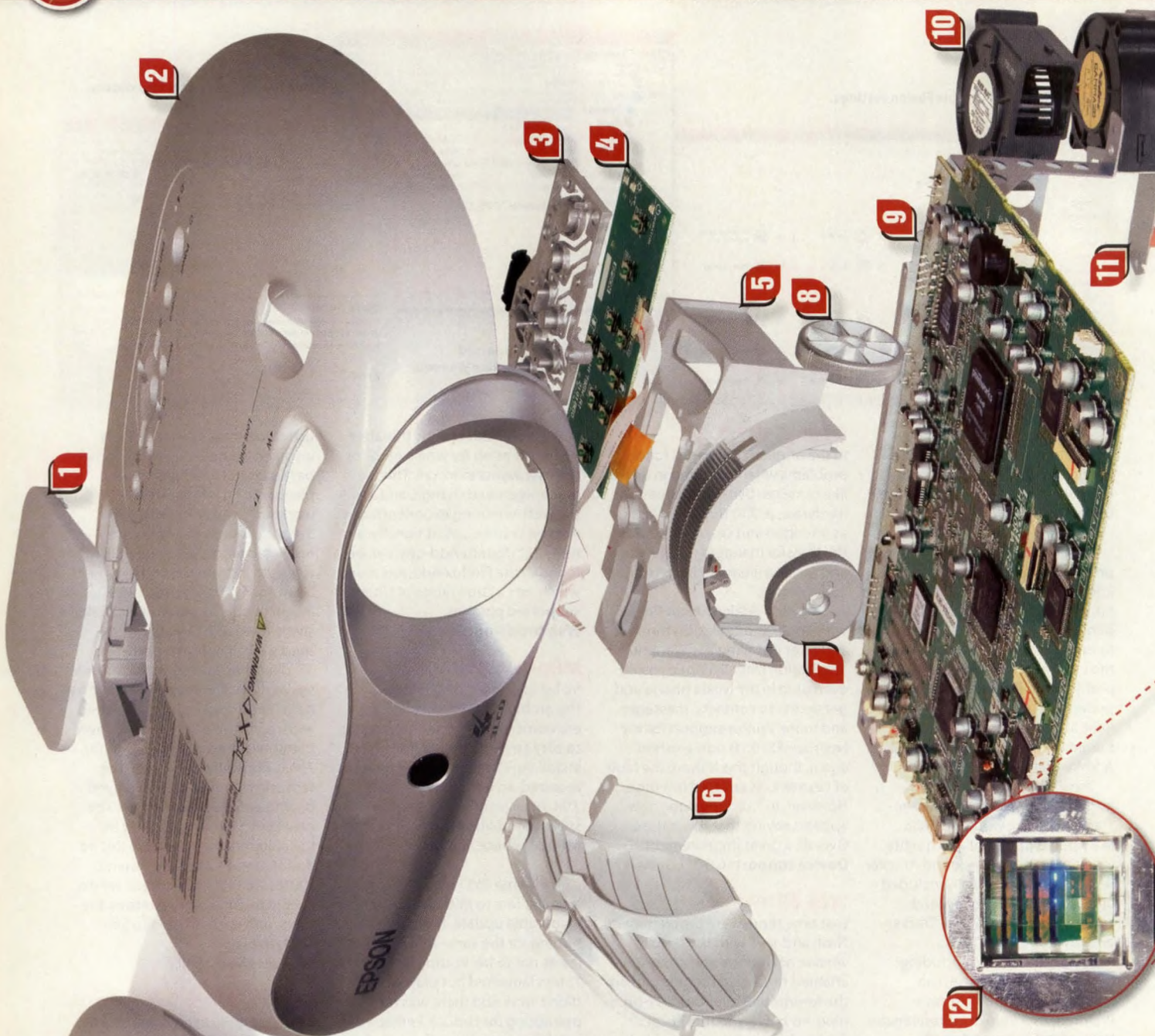


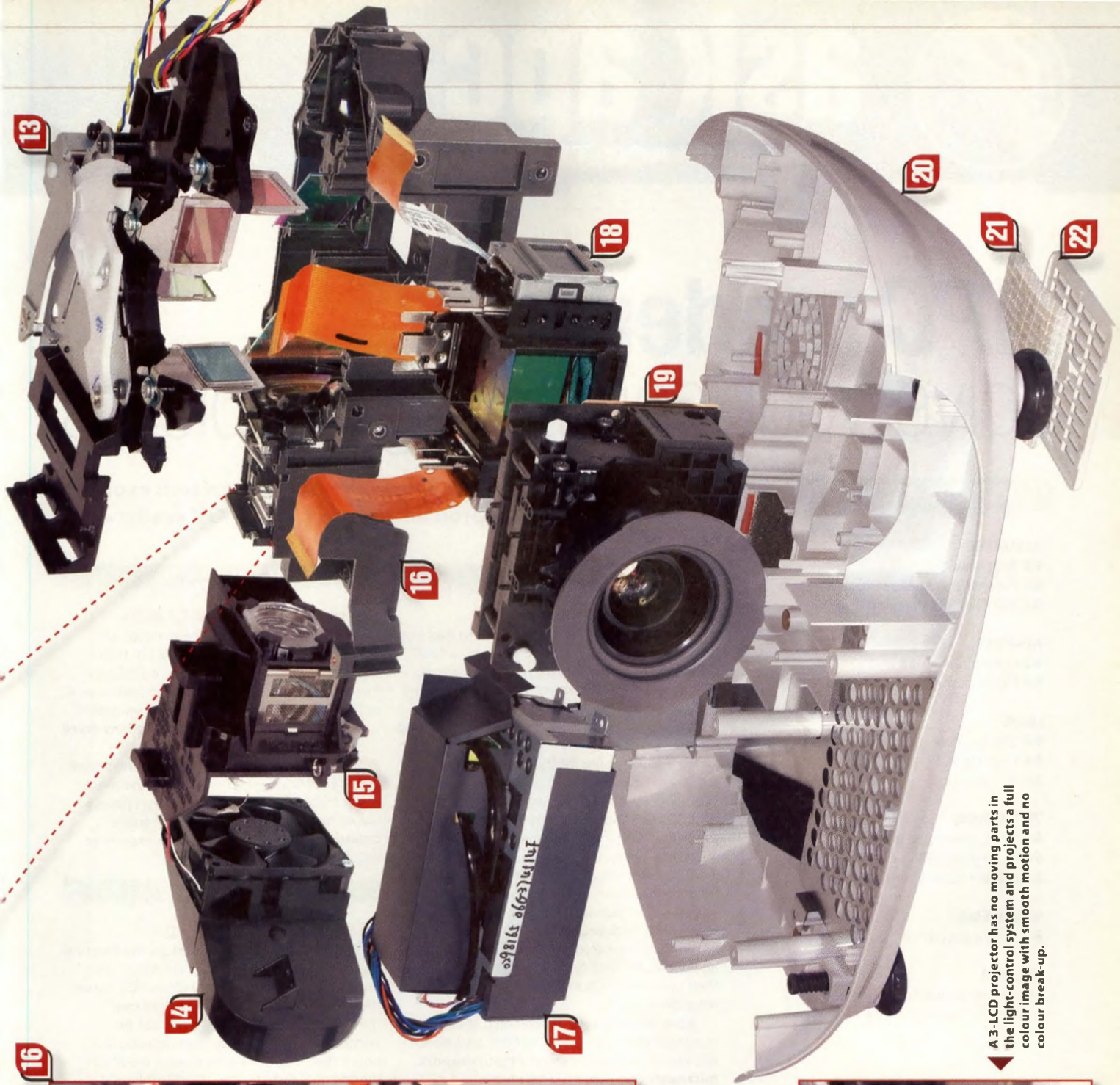
ape exploding tech

Epson EMP-TW20 projector

This month, we're exploding the Epson EMP-TW20 home theatre projector.

- 1 Lamp cover
- 2 Top cover
- 3 Control panel switches
- 4 Control panel circuit board
- 5 Lens shift mechanism cover
- 6 Exhaust cover
- 7 Lens shift wheel (horizontal)
- 8 Lens shift wheel (vertical)
- 9 Main control board
- 10 Lamp cooling fan
- 11 Air intake fan
- 12 Light polarizer
- 13 Optical engine top cover with the 3-LCD panels
- 14 Exhaust air duct
- 15 Lamp
- 16 Optical engine
- 17 Power supply
- 18 Prism
- 19 Projection lens with lens shift mechanism
- 20 Bottom cover
- 21 Air filter
- 22 Air filter cover





▲ A 3-LCD projector has no moving parts in the light-control system and projects a full colour image with smooth motion and no colour break-up.



▲ Light is separated into red, green and blue beams by stationary mirrors. Each colour passes through an LCD panel which creates shades of that colour. Single colour images are combined by a prism to create a full colour image in the projector, which then passes through a lens onto the screen.





APC readers solve your computing problems

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APC readers are Australia's single largest group of tech experts. If you have a technical problem, chances are an APC reader can solve it.

HARDWARE

SPACE MYSTERY

Q My computer seems to be losing space on drive C. It's partitioned so that C is 12GB and contains just Windows, while my data sits on drives G and H. However, I have noticed that my C drive now has only 250MB of free space.

Greg

A If you're using XP, the first thing I would advise you to do is click Start > Run and type in 'CMD' and press Enter. Then type in 'CHKDSK C: /F' and press Enter. You will then be presented with a message ending with this: 'next time the system restarts? (Y/N)'. Type 'yes' and press Enter. Restart the computer. After the Windows XP logo appears, a blue screen will appear with a 10-second countdown. Leave it to check your disk.

When Windows loads, click Start > Run again, but this time type in 'CLEANMGR' and then press Enter. Choose the C drive from the drop-down list.

A box appears with a meter on it. If it stops moving on the 'Compress Old Files' part, go to this site and follow the steps: <http://support.microsoft.com/kb/812248/en-au>.

To clean your System Restore points out, click on the second tab and click the bottom 'Clean Up...' button.

Then, go to the System Properties Control Panel by right-clicking My Computer and choosing Properties. Go to the System Restore tab and adjust the slider to turn down the amount of space that System Restore is permitted to use.

HARDWARE

EXPENSIVE VS CHEAP CABLES

Q Do cheap cables do the same job as expensive ones? Eg. Does a \$20 HDMI cable off eBay do the same job as a \$130 one from Harvey Norman? Same as an aerial, coaxial, optical, component Y Pb Pr and normal audio?

Andrew Pryce

A APC Technical editor Nick Race says more-expensive cables will tend to use more costly materials, but, in general, most people would be hard-pressed to hear or see the difference when comparing more-expensive cables against cheaper cables.

HARDWARE

4GB RAM NOT DETECTED

Q Our IT section purchased several identical workstations with ASUS P5WDG2-WS Professional motherboards with 4 x 1GB Corsair RAM and Core 2 Quad CPUs (both brands/models listed as supported by ASUS). But, Windows Vista, XP (32-bit) and Linux distros only detect 2GB RAM even though the BIOS reports 4GB. Everyone by now is probably aware that 32-bit versions of Vista and XP will not report 4GB of installed RAM but rather an amount between 2.75GB to 3.5GB depending on the devices installed, motherboard chipset and BIOS.

The systems we bought have 512MB video cards and, even if we're being very generous for other I/O devices, this does not explain why an entire 2GB RAM is missing. Furthermore, if I

WHAT'S WITH THE READER BOX?

APC will give readers whose answer is highlighted a small promotion box in which they can promote their business with a mission statement or slogan, and a URL or phone number.



YOUR NAME HERE

A brief detail about how awesome you are that you could help.
www.yourwebsite.com

remove 2GB of the RAM from the system, Windows still displays 2GB available. Boot switches such as /3GB have no effect either.

Despite carefully explaining this to ASUS Support, I got the '32-bit limitation' response and no further responses for help. I have done some more research into this and it may boil down to memory mapping, which doesn't seem to be an option in the BIOS setup.

Surely however ASUS would mention an inability to support more than 2GB of RAM if using a 32-bit operating system, if that is the case? You would think the ASUS Support Section could give an explanation. It must be an unusual issue, and I wonder whether we've lost use of 2GB of RAM while in a 32-bit OS or whether Windows is still accessing the additional 2GB but not reporting it.

Jason Wright

A Depending on the hardware used, Jason should theoretically be seeing anything from 2.5 to 3.2GB of RAM from his 4GB. If he's being limited to 2GB flat, then it's a strange result. This is one issue where APC would like to hear from other readers. In investigating it,

we've found a couple of references to users having the same problem, but only when using 975X-based motherboards with 4GB, as our reader is. We're also waiting on comments from ASUS.

WINDOWS

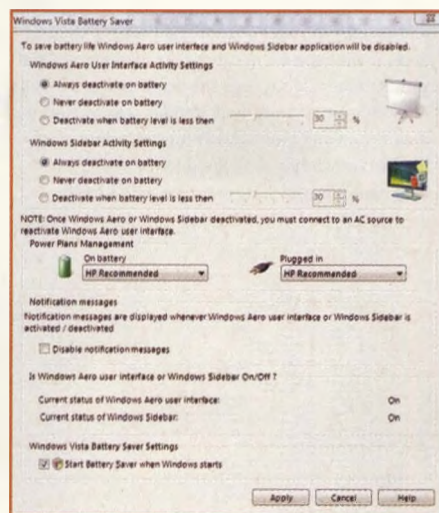
LONGER BATTERY LIFE

Q I have a laptop that was designed for Windows XP but which has accepted a Vista upgrade and is working well. However, I'm not getting the battery performance that I had before Vista was installed.

Douglas McGuyver

A Vista looks and performs beautifully — but it can be cruel to older batteries; this is because of the increased importance that Microsoft has placed on the graphical interface. Vista is the first Microsoft operating system to specify a desktop theme (Aero) as part of the operating system. Previous operating systems offered a choice of themes and largely left it to the user to decide. With Vista it is Microsoft's view (get it?) that if you aren't using Aero, then

you aren't properly using Vista either. For laptop users, this means an additional five to 10 per



Longer battery life: amazingly, enabling Aero can have a noticeable effect on your battery life.

TIP...

HARDWARE

A COOL CASE MOD

APC reader Justin Cataldo wanted something different for his Linux PC, which he uses as a file server to back up his Mac and for MySQL, Apache, VNC and other applications. Here, he explains how he went about it.

"After investigating popular mod designs for a PC case on the net, I decided that the shoe box and briefcase thing was all too common. I wanted to do something different for my Linux box. Being a drummer, I just happened to have an unused tom drum lying around. At first it seemed pretty crazy, but the more I thought about it, the more appealing the idea became.

I had some doubts about ventilation and safety issues, but the fact that I live with an engineer and an electrician came in handy. I didn't want to damage the shell of the drum too much, if at all, in case I wanted to use it in the future, so I had to keep this in mind during the process.

I took both skins off and unscrewed all of the lugs (the lugs are the metal mounts around the side of the shell that allow the skins to be attached).

I installed a loop of coated wire at each lug point and then screwed them back in. The aim was to basically have all of the components sort of levitating within the shell. First, I installed the motherboard, which I attached to the wires with

zip ties. Then I installed the hard drive and PSU and cut a hole in the skin for the power and Ethernet cables.

After running the machine for a while I realised the ambient temperature was about 55 degrees Celsius. Not too good. So I installed a few old 80mm fans I had in the top skin, which brought the ambient temperature down to a comfortable 44 degrees. The fan grilles were an added afterthought. I decided it needed some colour, so I then added blue neon and about nine red LEDs.

The motherboard and lights were the only components I had to buy. I had everything else lying around. So it only cost about \$150 to put together.

Now, whenever someone enters the house, they stop, look up and say 'What the hell is that?!?!' He he. It's pretty cool. And there's no need to turn lights on at night — that neon lights up the whole room!"

JUSTIN CATALDO

Justin did a computer science degree and now works for a financial institution doing system support. He's been drumming for 16 years (www.justincataldo.com) and has also set up a web design business. www.catalystwebservices.com.au.



CPU: Pentium 4 1.6GHz (Socket 478)
Motherboard: ASRock P4i65G
RAM: 1GB DDR400 PC3200 Kingston
Hard drive: 120GB Seagate 7,200rpm
Video: Onboard Intel 865G chipset
OS: Gentoo Linux

TIP... VISTA'S PROCESS MONITOR

PROCESS MONITOR IS A GREAT UTILITY TO USE WHEN A NEW APPLICATION DOES SOMETHING UNEXPECTED

1. FIRE IT UP

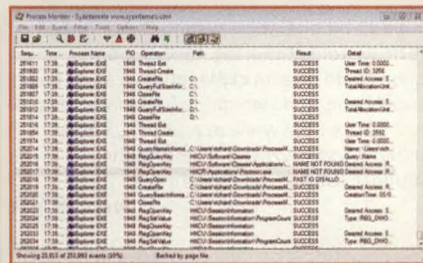
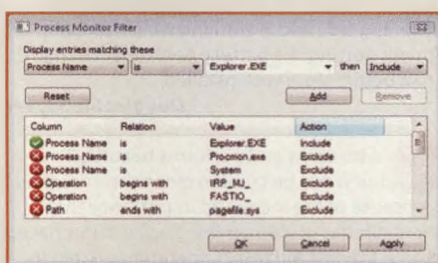
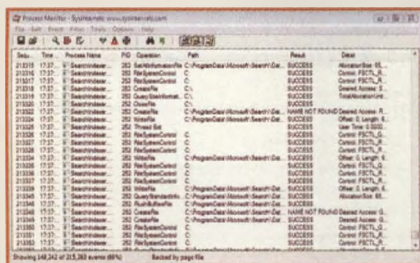
www.sysinternals.com has a large collection of utilities, including the new Process Monitor, which offers deep insight into the processes, file handling and registry of your PC. Load the Process Monitor and examine the list of processes. Vista reads and writes to the registry, and the list of processes runs into the tens of thousands. Another way to start the application and then start Process Monitor is to run the application until the error appears, and stop capturing any further events with Ctrl+E.

2. FILTER THE RESULTS

From within Process Monitor, choose to filter the shown events to just a subset, including events that were triggered by the bad application. Ctrl+L produces the filter dialog. Choose Process Name from the drop-down menu on the left and choose the process you wish to look at from the list on the right. Apply the filter. By default, Process Monitor shows registry, file handling and process tree entries; these can be further filtered using the three option buttons on the right of the toolbar.

3. FIND THE PROBLEM

Scroll along the list until an entry appears which looks out of place: file not found or out of bounds, end of file etc. Double-click on any entry to produce more information, such as the path and file name of the application that produced the process. This is a very small part of what Process Monitor can do. Use Process Activity Summary to see a list of all the processes and their load on the CPU. Or choose Ctrl+T to see the process tree and a list of running processes and child processes.



cent of demand on the battery. Some users have reported an hour or so difference in their battery life.

The solution for laptop users who want more from their batteries when using Vista may be with a little-known but fast-growing applet called the Vista Battery Saver. The Battery Saver offers control over the way that Vista manages the Aero theme when used on and off batteries. Because Aero and the Vista sidebar are so weighty, battery power can be preserved if these themes are disabled when AC power is removed from the notebook. Download the battery saver free from www.codeplex.com/vistabattery.

WINDOWS

TIDY BOOT MENU

Q Following an upgrade of Windows XP to Windows Vista Home Premium, I have a couple of unwanted entries on my boot menu. I can't find the boot.ini file. How can I make Windows Vista the default operating system and remove the other entries?

Simon Smith

A Computers hosting XP or 2000 installations have three files in the root of the active primary partition. These three files (ntldr, ntddetect.com and boot.ini) are used to find and load operating systems from instructions contained in the boot.ini file. Although boot.ini contains the instructions, it is actually ntldr that loads the system, which is why, if you leave a non-bootable USB device in a system configured to look to the USB port for the operating system first, you will see the message 'Can't find NTLDR'.

During an upgrade installation, Vista replaces ntldr with bootmgr and boot.ini with the BCD (the Boot Configuration Database). On new builds the Vista BCD is installed but does not appear by default as the PC is only host to a single operating system. In all installations, a third file called winload.exe is stored in the windows\system32 folder. Winload.exe loads Vista and creates a portion of the initial boot environment.

◀ Dual-booting is a great way to not be tied to the same OS for everything you do.

The unwanted boot entries you are looking for are contained in the BCD. The BCD is a database, created in the same way that the system registry is. It's not possible to edit complex registry files using a text editor. To edit the BCD it's necessary to use a command line tool called 'BCD edit', which is contained in windows\system32.

Boot into Vista and start a command shell ('cmd.exe' from the search menu). In the command shell type the following command: 'Bcdedit /default {current}'. This will name the loaded operating system as the default.

Alternatively, start msconfig.exe from the search tool and use the options in the boot tab to delete unwanted items and make one OS the default. If you are unsure, use msconfig.exe, as there's no risk of making the computer unbootable.

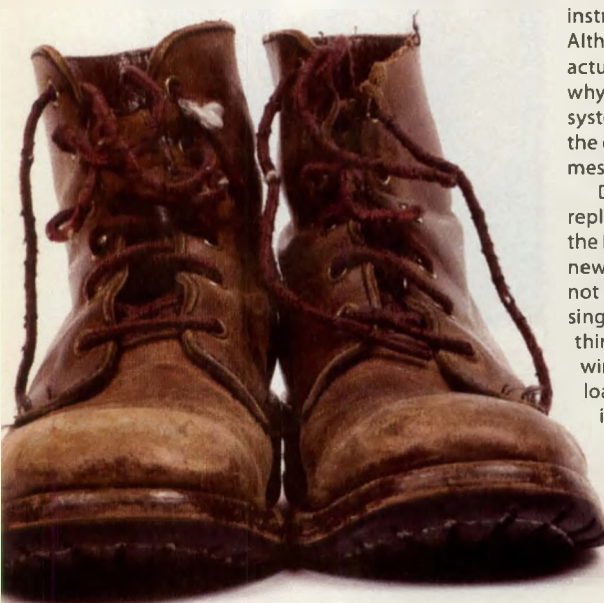
LINUX

CHANGE MORE DISTRIBUTIONS EASILY

Q I dual-boot my computer with Windows XP and Ubuntu Linux, but I'd like to try some of the other Linux distributions that are available. Is there a way I can switch from Ubuntu to Mandriva, for example, without losing all my personal files and settings?

Graham Sainsbury

A None of us tend to stick with the same distribution for long, but it can be a real pain reconfiguring your machine every time. Fortunately, there are several different approaches to this problem.



OGG-COMPATIBLE PLAYERS

In a recent article on MP3 and video playback, in the paragraph on encoding Vorbis, Paul and Graham said: "The only problem you might have with an Ogg Vorbis file is finding a compatible hardware player." I understand that dilemma, as I have been searching for Ogg-compatible players (portable), and I have two answers.

iRiver products generally come with an Ogg-playback feature, which is good news for Windows users, given that Winamp can rip to .ogg. I have found the file size smaller and the quality superior to MP3. And this was covered in the article.

The other bit of good news is for Palm OS users (I have a Life Drive), in the form of 'Aero Player'. It's a free download for the Ogg version, but fee-payable for MP3 ability. Works well on my Palm: www.aerodrome.us/aeroplayer/.

I am surprised at the reluctance of portable media player makers to include .ogg compatibility, as it is an open-source standard and would cost very little, and by way of effort only, to include it.

I would never contemplate ripping my music to .wma format, because I am not prepared to give that much power to Redmond.



When upgrading to a newer version of the same distro, both Mandriva and Ubuntu will let you upgrade your distribution easily. In the past, this process hasn't always been successful; when the hundreds of configuration files are migrated from one version to another, mistakes can creep in. However, we've not had any problems recently, which means that upgrading is now the best way to keep up to date.

If you want to switch distributions, however, things aren't quite so simple. The best thing to do is manually partition your drive beforehand, creating a separate root partition for the Linux distribution and a 'home' partition for your personal files. When you switch to a different distribution, simply let the installer use your root and home partitions, but only let it reformat 'root'. The result is that your settings and personal files stay intact on the home partition while the new distribution is installed

onto root. You will then be able to use all the new features of the upgrade and still have access to your files.

LINUX

ENABLING ACPI

Q I run a small Linux home server that I like to have available to access my music and files. This means that I leave it running all the time, but this seems like a waste of power when I only use it in the evenings. Is there some way I can suspend or hibernate the server so that it pops back to life when I need to access it?

Geoff Townsend

A The answer is to use one of your computer's power-saving modes to suspend or hibernate your machine when it's not being used. All modern Linux distributions will use a kernel that supports both features,

using part of the ACPI standard built into most modern pieces of kit, but many distributions opt to disable it by default. For example, on the KDE desktop you need to open the power-management control panel and enable ACPI before you can either suspend or hibernate your machine from the GUI. This is because certain ACPI functions have caused problems with Linux in the past, and most distributions will take the easy option of disabling it. But ACPI does work, and adding this functionality to your server isn't too hard.

The trick is to access the ACPI functions through the '/proc' file system. This is a dynamic virtual file system that represents the current state of the kernel, and it includes a folder for ACPI functions (type 'ls /proc/acpi' to see what we mean). From here you can probe your laptop's batteries and CPU temperature and set the power-saving mode using the virtual file 'sleep'.



Portable Linux: the Nokia N800 is small but packs a punch, running on a powerful version of Linux and with Wi-Fi built-in.



Type 'cat /proc/acpi/sleep' to see the available modes. Modes 3 and 4 are the most common, as these refer to suspend-to-ram and suspend-to-disk respectively. For example, to put your computer into mode 4, just type 'echo 4 > /proc/acpi/sleep' as root. You would then just need to configure your BIOS to use Wake-on-LAN to bring the machine out of the suspend mode and return to its server function.

LINUX

PORTABLE LINUX

Q I am looking for a low-cost portable device that will run Linux. I want something smaller than a laptop and not as pricey as a UMPC (such as the OQO). Is there a product you would recommend?

Raymond Tucker

A I think you should take a serious look at the new Nokia N800. It runs a modified version of Debian/Gnu Linux with X Window system and the GTK+ toolkit. It is supplied with the Opera web browser, a PDF viewer and Flash 9 support. There are also numerous Linux applications you can download and run on the N800, such as Skype and Rhapsody. It is fully wireless and Bluetooth-enabled, so you can even use it with a mobile phone to make free or low-cost internet calls.

NETWORKING

WI-FI CONNECTION WOES

Q My brick home is causing problems with my Wi-Fi network. I have a Netgear wireless ADSL router and my PCs are all connected using Wi-Fi, but in rooms furthest away from the router, I'm just registering a signal bar and 1MB/s according to my Windows wireless network connection. Also, my internet connection speed drops from about 2.5MB/s next to the router down to less than 300KB/s in these rooms. I have read about Wi-Fi range extenders and actually have a spare Linksys wireless router. How can I speed things up?

Roger Finnegan

A Range extenders work, and it's possible to set up a Linksys router to perform as one using Wireless Distribution System (WDS). I wouldn't do this, however, as you're in an older, brick building. Every range extender added to a network halves the bandwidth of anything connected, as the extender has to split between receiving and passing on data.

The simplest way to get better speed is probably to make use of your mains electrical wiring. There are various products available such as the Powerline range from Netgear. They plug in at any two points you wish to connect, as if they were wired by Ethernet.

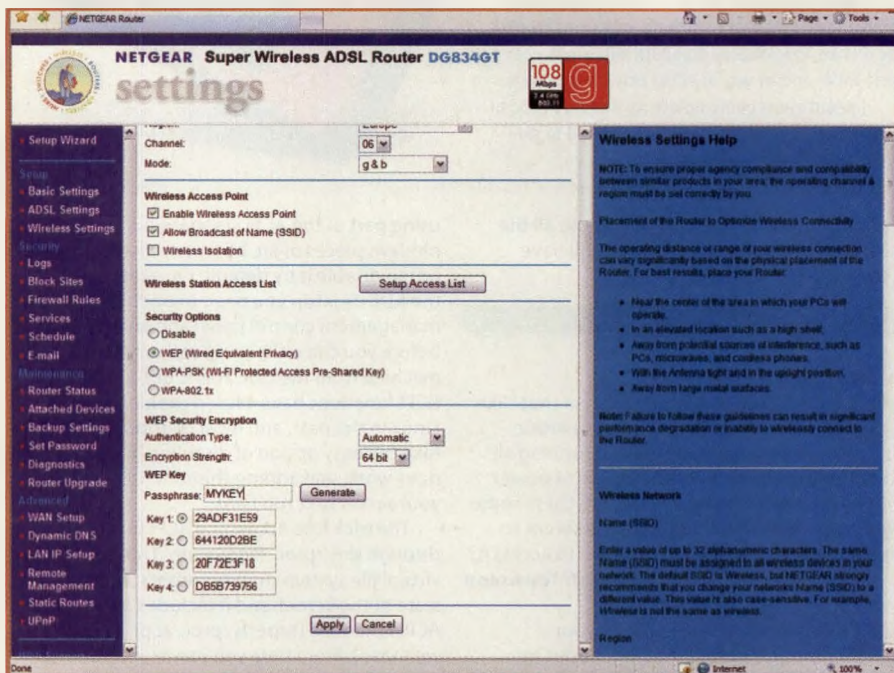
In your case, I recommend connecting one to your ADSL router and then a second to the point furthest away from it in your house you can find — the higher the better. Then plug your spare wireless router into it and you'll have a second full-speed access point. If you use the same SSID (the name the router identifies itself with to the network) for both routers, you should get seamless handovers when you carry any laptops around the house.

NETWORKING

SETTING UP WPA

Q I have a Netgear ADSL wireless router which I would like to add a password to in order to prevent my neighbours from using my bandwidth. How can I do this?

Sean Gibson



Setting up WPA: creating a WPA key on a Netgear wireless ADSL router is relatively simple.

TIP...

MOBILES

USBS JUST LIKE U3

Reading the 'Smart mobile working' article on page 110 of the July 2007 issue of APC prompted me to share a couple of alternatives with your readers. The first is Ceedo (www.ceedo.com) which cost US\$29.95 and allows the use of any USB memory device, including USB hard drives, adding similar functions as on U3 USB drives. My favourite, however, is a completely free alternative from <http://portableapps.com>, which is available in a 'light' or full version — both completely free and without any malware (that I know of). This site also has a number of individual applications that can be added to the installation, and you can also add your own apps as long as they can operate from within a single folder. When Portable Apps is combined with TrueCrypt — another free program under the GNU licence — then your USB device can provide good security and portability. TrueCrypt can be used to create an encrypted container file, which, when accessed using the pass phrase, appears as an additional drive letter. By locating

all of the Portable Apps environment here, your data is protected from falling into unauthorised hands should the USB memory ever be lost.

To further enhance the portability option, just add an automatic backup program to your home PC, which will auto-back up your USB drive to the local PC as soon as the USB device is inserted and recognised. Two backup programs that can do this spring to mind: SyncBack from www.2brightsparks.com and Second Copy 2000 from Centred Systems (www.secondcopy.com). Both of these are very powerful and reasonably priced programs.

BY PAUL SZILARD

Paul Szilard has more than 20 years experience in IT and has worked in the US, UK, Japan and Australia with IBM. He currently provides IT, web development, hosting and photographic services via his consulting company RemekTek www.remektek.com.au, located in North Sydney.





◀ **Straight to DVD:** where home movies go if the family director doesn't want to edit first.

'RunDll32 advpack.dll,LaunchINFSection %windir%\inf\msmsgs.inf,BLC.Remove'.

Ensure there is a single space after 'Dll32' and after 'Section'. I won't explain what all that is, but, suffice to say, you shouldn't be bothered again.

MULTIMEDIA

HANDYCAM ADVICE

Q I am in the process of purchasing a digital camcorder and require some advice as to what are the advantages and disadvantages of a system that records directly to DVD and one that records to an internal hard drive?

John Proud

A The first thing that you need to decide is whether you want to simply shoot the video and play it back later or whether you want to edit the video first. If you just want to view it, then a camcorder that records directly to DVD is ideal, because you can just pull out the disc and watch it immediately on a DVD player. But if you want to edit the video, then you need a camcorder with a hard drive (or tape) so that you can import the video file you've shot into a video editing application. Make sure you get decent video-editing software because, quite honestly, the software that comes with video cameras or Windows (Windows Movie Maker) is woeful. If you happen to use a Mac, then iMovie would do fine; otherwise, consider something like Sony Vegas, which supports HD formats as well. If you are intending to capture the video in HD, you will need to make sure the camera is HD (1080p is best). This would be quite expensive; however, you may wish to consider an HD camcorder so that you can future-proof.



BY JAKE SCHOERMER

Jake is a 16 year old high school student currently doing an IT traineeship with his local computer shop Rix Computers.
www.rix.net.au

I WON'T EXPLAIN WHAT ALL THAT IS, BUT, SUFFICE TO SAY, YOU SHOULDN'T BE BOTHERED AGAIN.

A Securing your network is not as hard as it might seem. What you need to do is log into your router. To find your router's IP address, select Start > Run, type 'CMD' and press Enter. Then type 'ipconfig /all'. The IP address given for your Default Gateway will be your router, and you should type that IP into your browser. This will bring up a password dialog. On many routers, the default login and password are 'admin' and 'password'. Refer to your manual if that doesn't work.

Within the router's interface, under a Wireless Settings or Wireless Security tab, you'll find an area where you can enter a WPA-PSK (Pre Shared) Key — this is a more-secure encryption system than the better-known WEP.

On most routers you can enter a Network Key, which should consist of between eight and 63 characters. This is your Shared Secret, and should be as random and un-guessable as you can make it. For example, a good key might look like 'gh5d4\$189&cv2@:', which is totally valid for WPA. The longer the key, the more secure it will be. Write this key down and click on 'Apply' or 'OK'.

If you are connected wirelessly to your router you will lose your connection, so open up Control Panel and select 'Wireless Network Connection' from 'Network Connections'. Now click on 'View Wireless Networks' and choose 'Refresh Network List'. Double-click on your router name and you will be notified that the network requires a WPA key. Enter the key into the two fields and click on 'Connect'.

All being well, you will now be connected back to your router and should log back into

it to change the login and password to something your neighbours could not guess. Now repeat, adding the encryption key to any other computers that connect wirelessly to your computer.

NETWORKING

DISABLE INSTANT MESSAGING

Q I never use the program MSN Messenger but, after I close it, the program reappears the next time I restart my PC. I have looked in 'Add/Remove programs' and cannot find it in there. Is there a way I can stop MSN Messenger from automatically starting?

Daniel Ward

A If you are absolutely sure you will never use this program again, just type in the following command to get rid of MSN Messenger for good. Select 'Start', 'Run' and enter 'CMD', then type the following command:

TIP...

FASTER UNDELETE

ANOTHER READER'S TIPS FOR QUICKER DELETION OF FILES

Following on from Graeme Zimmer's piece on 'quick delete' (APC October, page 90), there are two other two other ways of doing it.

1. Right-click the recycle bin and enter properties. Check 'turn off recycle bin', so nothing goes there.
2. If you don't like to have the bin turned off, the easiest way to bypass the bin for a file you know you won't want is to hold down the shift key when

you hit the delete button (either the 'X' or the 'delete' from the right click menu). A pop-up appears asking if you want to delete (note: it doesn't ask if you want it sent to the recycle bin) Hit 'OK' and it's gone!

All 'delete' does on a computer is remove reference to it on the hard drive, so that it can use that space to overwrite with other things.



INTERNET

READER ANSWERS OWN QUESTION

Q I have an Acer Aspire 5600, on which I am unable to change the home page in IE (no matter what I try).

A I decided to try googling "change Acer home page". There were many people complaining of the same problem. One recurrent theme was that ZoneAlarm Firewall could cause the problem — particularly one version of that application, which has now been superseded. So, I updated my ZoneAlarm and that seems to have cured the problem. It must have been something in that particular version, as I retained my old settings, so they could not have been the problem. So, the poor old Acer company seems to have been innocent! However, it would have been nice if they could have replied to my inquiry, which would have eliminated one possibility for the problem — and I might have found a cure earlier and easier. It sure feels good to have control of my computer again. . . well, 'seem to' have control of my computer.

BY JOE PEDERSEN

Joe appreciates companies that advertise by offering free use of older or limited programs, such as AVG, ZoneAlarm, Ad-Aware, Spybot, Linux and others.

Got a blank screen of death? Check the resolution the video card is using.



MORE ANSWERS TO PREVIOUS QUESTIONS

CLOSING APPS WITHOUT SHUTTING WINDOWS — APC OCTOBER, PAGE 89

In the October edition of APC Magazine, you gave some advice for closing and re-opening non-responsive applications in Windows XP that avoids rebooting the PC. Apart from the fact that I can't simultaneously hold down the Ctrl+Alt+Del keys (a two-handed operation for me) and manipulate the mouse as well (part of your recommendation), there is another easy way to achieve the same result in XP.

1. Use the Ctrl+Alt+Del keys to bring up the Windows Security window.
2. Select the 'Task Manager' tab.
3. Under the 'Applications' tab in Task Manager, shut down any open applications.
4. Select the 'Processes' tab.
5. Find explorer.exe in the list of processes running on the PC, select it and 'End Process'.
6. Answer 'Yes' to the warning message.
7. Return to the 'Applications' tab in Task Manager again.
8. Click on 'New Task'.
9. Type 'explorer' in the task window and select OK.

Windows Explorer should now return you to your user-defined desktop. All you have to do now is close 'Task Manager' and get on with

your computing. I have used this fix to avoid rebooting when my PC loses connectivity to the internet via my Ethernet router. It seems to have the same result as a full reboot of the system.

BY FRANK JONES

Frank is a retired social science academic who just likes to keep up with things. He used computers a lot for statistical analysis before he retired back in 2001. He loves to keep his hand in.

SYNMASTER MONITOR ISSUE — APC SEPTEMBER, PAGE 92

I get this problem every now and then when I am imaging machines. The problem is that the video card has set the monitor to a resolution higher than it can display, which, with LCD monitors, just causes it to go blank. Some will display a message such as 'Out of Range', but others do not. During the booting of Windows 2000, press F8 to access the advanced boot options and select 'VGA Mode' This will start the machine in 640 x 480 resolution. Then you should be able to select a resolution that your monitor can display (1,024 x 768 is a safe bet) and you should have no further trouble.

Aaron Thorpe

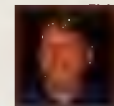
HOW TO BECOME A PROGRAMMER — APC AUGUST, PAGE 99

As a self-taught programmer, I've found that the best way to learn a new programming language is to use a combination of online tutorials and reference books.

Online tutorials are great if you don't want to spend money on books, or if you don't like reading away from the computer — the trick is to find a good beginner's tutorial.

I like to search for tutorials using search terms like 'dummies', 'beginner', or 'novice'. This generally brings up sites that are written by people like us, who've learnt the language themselves and know how to explain it in an easy-to-understand way, as opposed to the people who actually wrote the programming language and whose tutorials are far too technical for beginners.

Books, on the other hand, are great for when you get tired of reading from the computer screen, and are really handy as a reference when looking up the proper syntax for a bit of code. Good books to look for are the 'Dummies' or 'Idiot's Guide' series, or other books geared towards people with little to no prior experience.



BY PETER ANDERSON

Peter is a 21-year-old IT student from Coffs Harbour, NSW. He enjoys designing web sites and databases and is an amateur photographer. He is currently in his third year of uni, studying a variety of different topics including web development, database design, C++ and Java programming (and a bit of multimedia). www.panda.id.au

Edit

Help



Ask the questions

Send your technical questions, for other expert readers to answer, to askapc@acpmagazines.com.au.

Q I have a wide-screen monitor running at 1,680 x 1,050. My old (VGA) KVM switch simply cannot handle it, although I'm at a loss as to why — surely the monitor signal should just get passed through as is. I thought if I went digital all my problems would disappear, so I bought a couple of cheap DVI-out video cards. As a temporary measure I have one PC running with DVI and the other with VGA, and use the KVM switch just for the keyboard and mouse (and use the input select on the monitor to swap the video over). That would be fine if the monitor had a dedicated input select, but of course it doesn't — I have to go through a convoluted menu to get to it. This is driving me insane.

I have looked at DVI KVM switches on the net and it seems to be very hard to find one that handles resolution above 1,280 x 1,024. I thought it all boiled down to single vs dual channel and, as far as I know, 1,680 x 1,050 is still single? I have contacted various manufacturers and retailers, but the question just seems too hard for them. Any advice would be much appreciated.

Peter Faulks

Q I have a problem with PDF files. Once I open a PDF file using Adobe Acrobat

Reader 8, the computer slows down to a standstill and it takes forever to do anything, even after the PDF file has been closed and is not in use. The only thing to do is to restart the computer using the reset button, as it is impossible to do a normal shutdown. Does anyone have an explanation as to why this is happening? I should mention that this only started happening since I updated to the latest version of Acrobat Reader.

Vicky Mcleish

Q Windows Mail (the Vista version of Outlook Express) does not support HTTP servers used by Hotmail (and others). Is it possible to install Outlook Express on Vista?

Les Hill

Q My computer never reboots without giving me the following message: 'CPU is unworkable or has been changed. Please recheck CPU Soft Menu. Press F1 to continue.' Clearly something has gone wrong. It occurred a few months ago. I suspect a power surge? The computer works as per normal except I have to hit F1 to reboot the computer every time, and then the computer boots up as per normal?

Adam Kelly

Q I am running Vista Ultimate with 2GB RAM and 1GB TurboBoost on a Laptop (ASUS F3SV-AK136G). I want to increase the battery life and reduce boot and restart times. I am intending to manually set a pagefile size (same min. and max. settings) on the non-boot disk, but I am wondering what size of pagefile I should set, or if there are other alternatives to using a pagefile?

What effect will deleting the pagefile altogether have on performance? I'd be happy to buy up to a 4GB USB drive if this will assist, but will this compete with the TurboBoost?

Alternatively, to get to 3GB RAM I suspect I will have to swap out a 1GB module and get a 2GB module — which would become quite pricey?

Dil Bert

Q My family has four computers on a LAN network, each protected with antivirus/antispware software. However, I am worried that if one computer gets infected with a virus, it will spread to the other computers on the network. Could this actually happen and, if it could, is there a solution or software package that could prevent it?

Matthew Wun

Answer the questions

If you feel you can answer one of the questions above, please send the answer to askapc@acpmagazines.com.au.

APC will give any readers whose answer is published a small promotion box in which they can promote their business with a mission

statement or slogan, and a URL or phone number. Try to make the answer no longer than 200 words, but less is better. If none of our

readers can offer an answer to a particular question, we will turn to our list of industry experts to provide a solution for your queries.



masterclass

STEP-BY-STEP TRAINING

HARDWARE

SOFTWARE

GADGETS

Building a small business network

You might be handy with a PC, but what if you had to look after the back end of your business? How would you set up and manage the servers, the network and the server applications?

WHAT'S COVERED

Overview

In this new Masterclass, Jarrod Spiga walks you through the process of setting up a small business IT infrastructure. No IT training is assumed. At the end of the Masterclass, you should know the fundamentals of setting up a server-based network to run any small business.

ABOUT YOUR TUTOR

Jarrod Spiga

Jarrod is an infrastructure architect and data centre engineer for Visionbytes, a company that provides digital video mining technologies and services to some of the world's largest media companies and many government departments worldwide. Jarrod also works as a technical consultant, assisting businesses during infrastructure installation and upgrade projects.



COURSE SCHEDULE

- Sept '07 Analysis
- Oct '07 Preparation
- Nov '07 The Windows path, part 1
- Dec '07 The Windows path, part 2
- Jan '08 The Windows path, part 3
- Feb '08 Server hardware
- Mar '08 The Linux path, part 1
- Apr '08 The Linux path, part 2
- May '08 The Linux path, part 3
- Jun '08 Mac in the mix
- Jul '08 System management tools
- Aug '08 Swing migrations

Part 4

End-user services under SBS 2003

Now that your SMB installation is up and running, it's time to start providing services to your end users.

Getting your server up and running with a basic configuration and adding user accounts and workstations to your domain is not too dissimilar to having machines strewn across your network in an ad hoc fashion. All the work that's been done so far has been in preparation for what is covered in this article — the provisioning of services to your users from this central server.

Mail for the masses

The one service that business users rely on more than any other is email, so it's probably the best place to start. In many cases, the configuration of Exchange that we have done up to this point (during the installation of SBS components) is adequate, and the 'Set up Client Computers' wizard should have installed Microsoft Outlook 2003 SP1 on each workstation and configured it so that it automatically connects to the Exchange server (of course, users should also be able to access Outlook Web Access — a webmail applet — via pointing their web browser to <http://server-name/Exchange> once their user account has been created).

But one size rarely fits all, and some readers may need to perform additional configuration steps in order to get their email services working to their liking. One or more of the following additional tasks tend to be required for many small businesses.

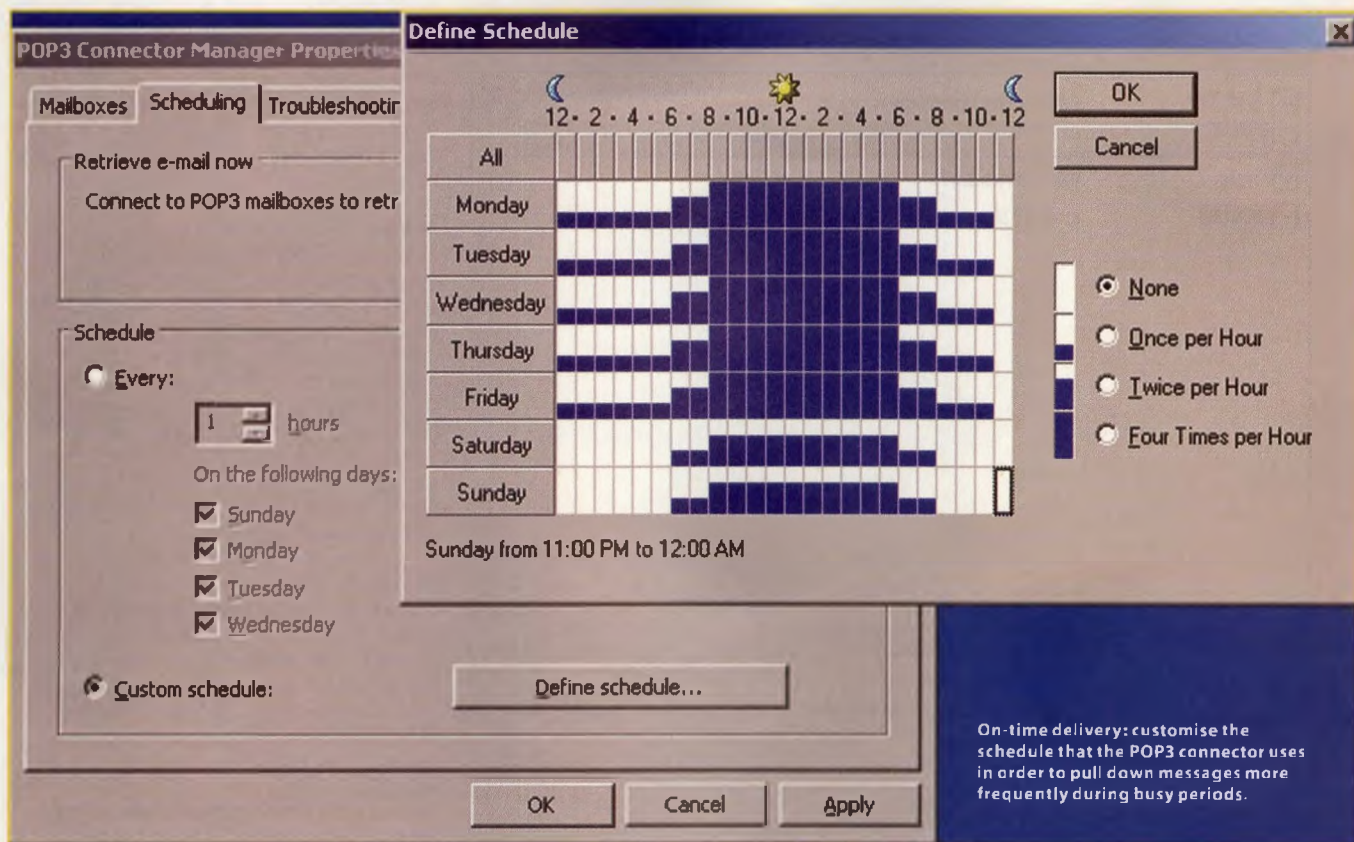
CONFIGURE THE POP3 CONNECTOR

If your ISP or web hosting provider already accepts email for your domain and you'd prefer to keep it that way (as opposed to getting mail delivered directly to SBS), the POP3 connector should be configured to regularly pull down messages from the remote server. The option to do this lies under the Advanced Management > POP3 Connection Manager applet within the Server Management Console (SMC).

Once this applet is open, start adding details about the POP3 services that you wish to pull email down from. There are two types of mailboxes that are supported:

- User mailboxes — where mail for a single person only is delivered to the mailbox on the remote POP3 server (and delivered directly to a single mailbox in Exchange); or
- Global mailboxes — where mail for more than one user is delivered to a single remote mailbox and Exchange applies 'routing rules' based on the addresses listed in the 'to' and 'cc' fields of each email to deliver each message to the correct mailbox or mailboxes.

If you don't know which type of rule to configure for a given POP3 mailbox, contact the administrator of the remote mail system — they should easily be able to tell you which type of mailbox configuration you have.



Once you've added all of the rules that need to be added, click on to the Scheduling tab and set when and how regularly you want the POP3 connector to check remote servers for email. In order to minimise load on your server and remote servers, it's best to customise the schedule so that remote mailboxes are polled most frequently during business hours, and infrequently at other times. Also, consider configuring the schedule to **not** check for messages during a one-hour block each day, so that the backup (which we'll configure shortly) can run without tripping over the POP3 connector.

Lastly, it's a good idea to configure the connector to deliver email that it cannot route to the Administrator's mailbox — that way, they can review these messages, manually forward them and reconfigure the connector if required.

ADDING OR REMOVING AN EMAIL SMARTHOST

As mentioned in last month's guide, many ISPs do not allow outbound connections on port 25 — which will prevent Exchange from directly sending email to the remote mail server. In these

cases, Exchange needs to be configured to use your ISP's mail server as a smarthost.

If your ISP currently does not filter outbound connections on port 25 but will implement this policy in the future (or vice versa), the easiest way to add (or remove) smarthost settings is to re-run the 'Configure E-mail and Internet Connection Wizard'. This can be done by selecting Internet and E-mail > Repair Internet and E-mail settings under the SMC.

ADDITIONAL EMAIL DOMAINS

The wizards in SBS assume that you have registered only a single domain name that is used for email. As a result, further configuration is required if you wish to receive email addressed to multiple domains (ie. if you want to receive email addressed to 'contoso.com.au' as well as 'contoso.com').

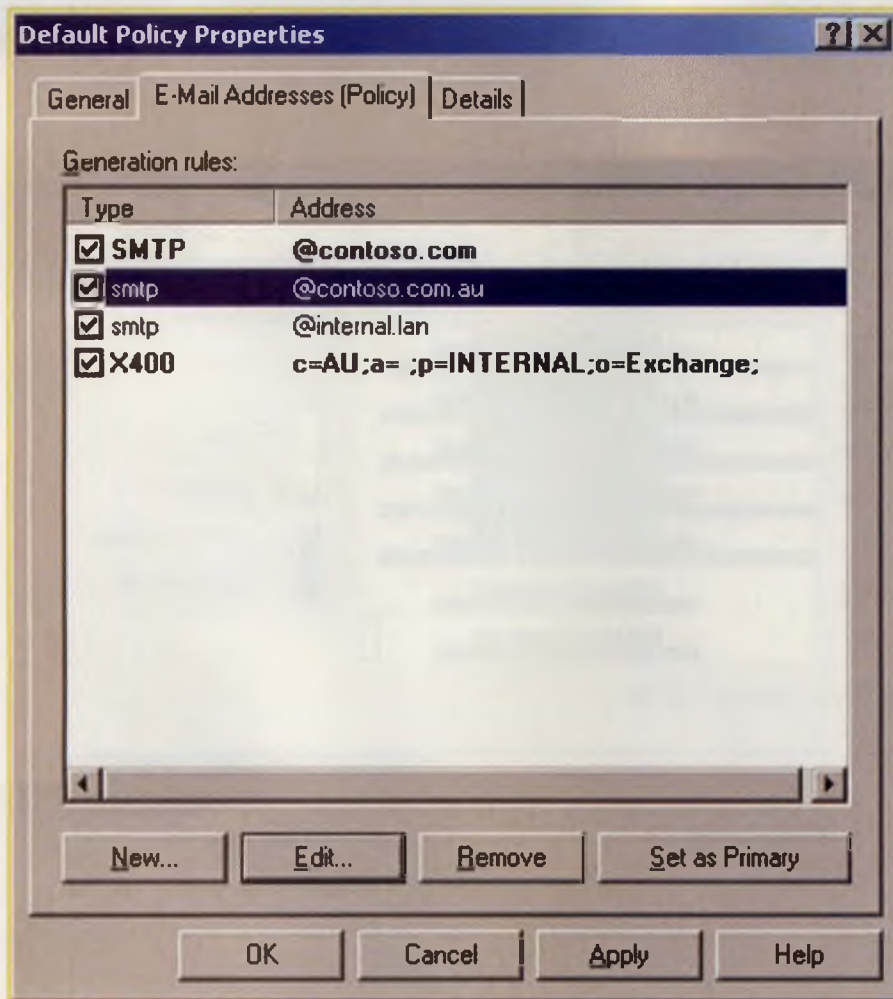
Additional email domains need to be added via a recipient policy, defined under Advanced Management > Name of your Exchange organisation (Exchange) > Recipients > Recipient Policies from within the SMC. Right-click on the Default Policy and bring up the Properties page (or create a new policy from scratch, if you're

game). Additional domains should be added under the Email Addresses (Policy) tab and should be prefixed with the @ symbol. Once you've made your policy change, be sure to right-click on the policy you modified and select 'Apply this policy now...' in order to force the changes to take effect immediately.

DNS BLACKLISTING

Unsolicited email is a major annoyance to most people, and DNS Blacklisting is a common method used to reduce the amount of SPAM that ends up in your inbox. DNS Blacklisting services can be added by right-clicking on Message Delivery, located under Advanced Management > Name of your Exchange organisation (Exchange) > Global Settings from within SMC and navigating to the Connection Filtering tab. To add a blacklist provider, click on the Add button and enter the address of the blacklist to the DNS Suffix of Provider field.

Picking a dependable blacklist provider can be tricky, but using one of the following providers is generally a good idea (using more than one provider is not advised):



Master of your domain: accept email addressed to multiple domains by modifying the default recipient policy.

The final page of each wizard allows you to select whether you want to archive all messages sent to the distribution list to a public folder (accessible to all members of the group from within Outlook) and whether you want the list accessible by external parties. It's generally a good idea to disable this last option — imagine if a spammer could email everyone on the list without knowing their actual email address?

RESOURCE MAILBOXES

Exchange can also be used to manage resources such as meeting rooms, parking spaces, projectors and shared laptops. Initially, an Exchange Administrator would configure a mailbox for each resource, log on to the resource mailbox and adjust the Resource Scheduling settings. The big problem with using this method was that meeting organisers had to categorise the resource properly when planning a meeting. It was too easy to forget (or not know how) to do this in reality, which means that this method is practically useless.

In response to feedback, Microsoft later developed an add-on agent that handles resource requests in a much easier-to-use fashion. This add-on can be downloaded from <http://go.microsoft.com/fwlink/?linkid=28650>. Documentation on the agent can be found at <http://go.microsoft.com/fwlink/?LinkId=27921>.

PUBLIC FOLDERS

There is often a need to share Outlook data (be it contact, calendar, task or email data) between groups of people within an organisation. Up until recently, this data has almost always been stored in public folders within Exchange. Indeed, a default installation of SBS has two pre-defined public folders — one for shared contacts and the other for storing Newsgroup data (if the NNTP connector is configured and enabled). Public folders are managed under Advanced Management > Name of your Exchange organisation (Exchange) > Folders > Public Folders.

Technically speaking, public folders are now a deprecated feature of Exchange. Even though it's currently possible (but difficult) to use public folders under Exchange 2007, Microsoft has stated that public folders will continue to be supported until 2016. By this time they hope that organisations will be utilising SharePoint Services 3.0 or later instead of public folders.

But SharePoint Services 2.0 is already installed on your server, and it's tightly integrated with SBS. Upgrading SharePoint Services will cause various parts of SBS to no longer function as intended. Additionally, due to a conflict with Exchange 2003, you will also lose the ability to mail-enable public folders.



ONCE THE CORE FEATURES ARE RUNNING PROPERLY, IT'S TIME TO GET FAMILIAR WITH THE DAY-TO-DAY ADMIN TASKS

- relays.ordb.org
- relays.visi.com
- bl.spamcop.net
- blackholes.wirehub.net
- list.dsbl.org

Mail administration tasks

Once the core features of Exchange are running properly, it's time to start becoming familiar with some of the day-to-day Exchange-related administration tasks that you're likely to be asked to perform.

GROUP MENTALITY

Groups can be utilised in order to create mailing lists within your organisation. For instance, say that you have a couple of different teams of people working on different projects and you want to be able

to easily email all users associated with a given project. By creating a group, adding the individual user accounts to the group and sending the email to the group, all members of the group will receive your message.

There are two classes of groups in a Windows Active Directory domain — distribution groups and security groups — and both types of groups can be used to create mailing lists within your Exchange Organisation. In general, you should create a distribution group, unless you also want to restrict or grant access to resources on your network to the members of the group.

Like most tasks under SBS, there are wizards to assist with the creation of both types of groups. If you add a user as the manager of a distribution group, that will provide that user with the ability to change the membership of the group using Outlook.

However, the lesson is clear — unless you have a specific need to, you should not install SharePoint Services 3.0 on SBS. If you must, ensure that you follow the instructions located at <http://go.microsoft.com/fwlink/?LinkId=77404> before you do so. For everyone else, though, keep using public folders and worry about migration later.

Sharing is caring

One of the next most-critical services that your server can offer is a centralised location to store data. By using the file server functionality of SBS, users can save important documents in defined repositories. Not only does this make finding documents easier, it also makes it easier to get accurate backups of all company data and to restrict access to sensitive information. SBS can also natively share printers in much the same fashion.

THE EXISTING SHARES

At least 15 different locations on your server are shared for various purposes after the installation of SBS (the actual number varies depending on how many disk partitions you have on your server). Most of these are used for administrative purposes, including storing the installation data for client applications and various logs and scripts.

The one share of note that is automatically created is the Users share. A subdirectory is created under this location for every user account created on your server, the idea being that every user has the ability to store certain personal data. It's important to note that, by default, only Administrators and each specific user have access to any given user's directory under this share.

BONUS TIP

- If your share name has a dollar sign at the end, the share will be hidden from view if a user browses to the server.

CREATE SHARES

It's a wise idea to create a number of other shares (pointing to a location on a non-system partition) in order to provide repositories for your users to save other potentially sensitive data (including My Documents Folder Redirection, as detailed below). File shares can be added via — you guessed it — the 'Add a Shared Folder' wizard, accessible under Shares (Local) within SMC, while Printer shares are added using the similar wizard located under the Printers section.

CREATE GROUPS

Avoid the temptation to assign permissions for file-share resources to individual users — while this gives you the most granular control over access, adding permissions for new users to each share is then a long and repetitive process, not to mention that you might forget to grant or deny permissions to particular resources. The best practice is to assign permissions to security groups — and add users to those groups. This way, instead of having to add permissions for a new user to each individual share, you simply add the user to the relevant security groups. If you then need to deny certain rights to access a resource for a particular user, you can then add a permissions entry with an implicit deny for that specific user (implicit deny permissions entries will always override an allow entry).

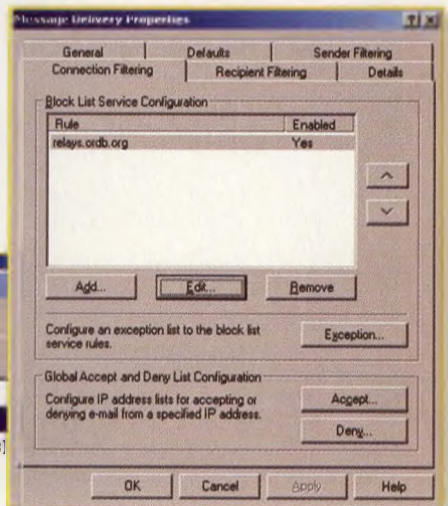
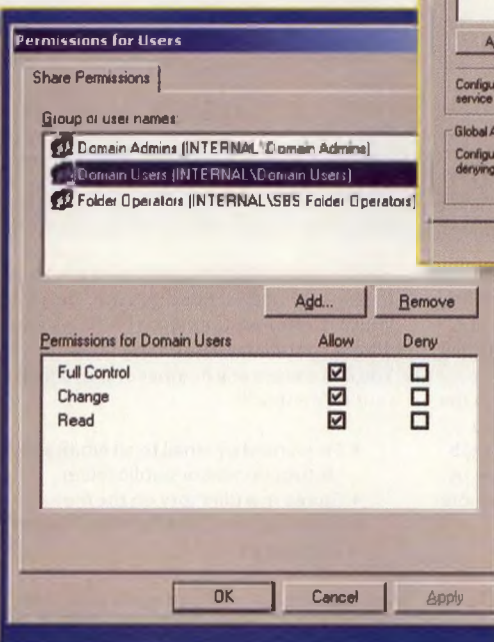
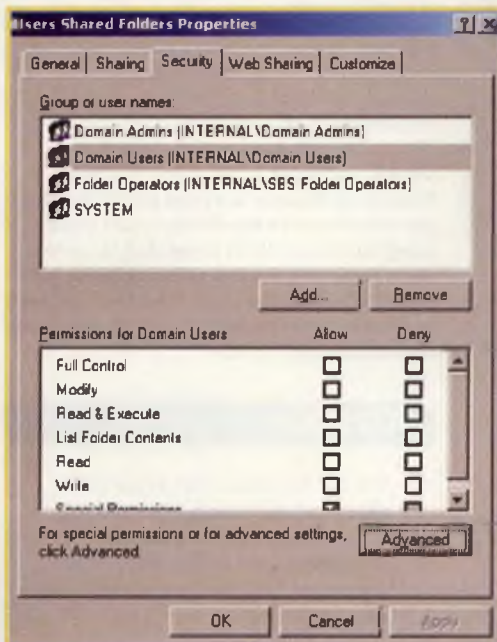
SHARE-LEVEL VS FILE-SYSTEM PERMISSIONS

The permissions granted to any given user are a union of the share and file-system permissions — so remember to set permissions on the file system as well as on the share definition. Take the Users share for example. The Domain Users group has Full Control permissions on the share but a limited permission set to the file system. As a result, non-administrator users can connect to the share and obtain a list of directories, but they cannot create files at this location.

Going one level deeper, look at the file-system permissions for the directory that belongs to one of your users. The Domain Users group has no permissions entry on this directory. As a result, all users bar the owner will not have access (the owner has access thanks to their own permissions entry on the directory). In order to grant access to any shared resource, permissions for both the share and file system must be granted.

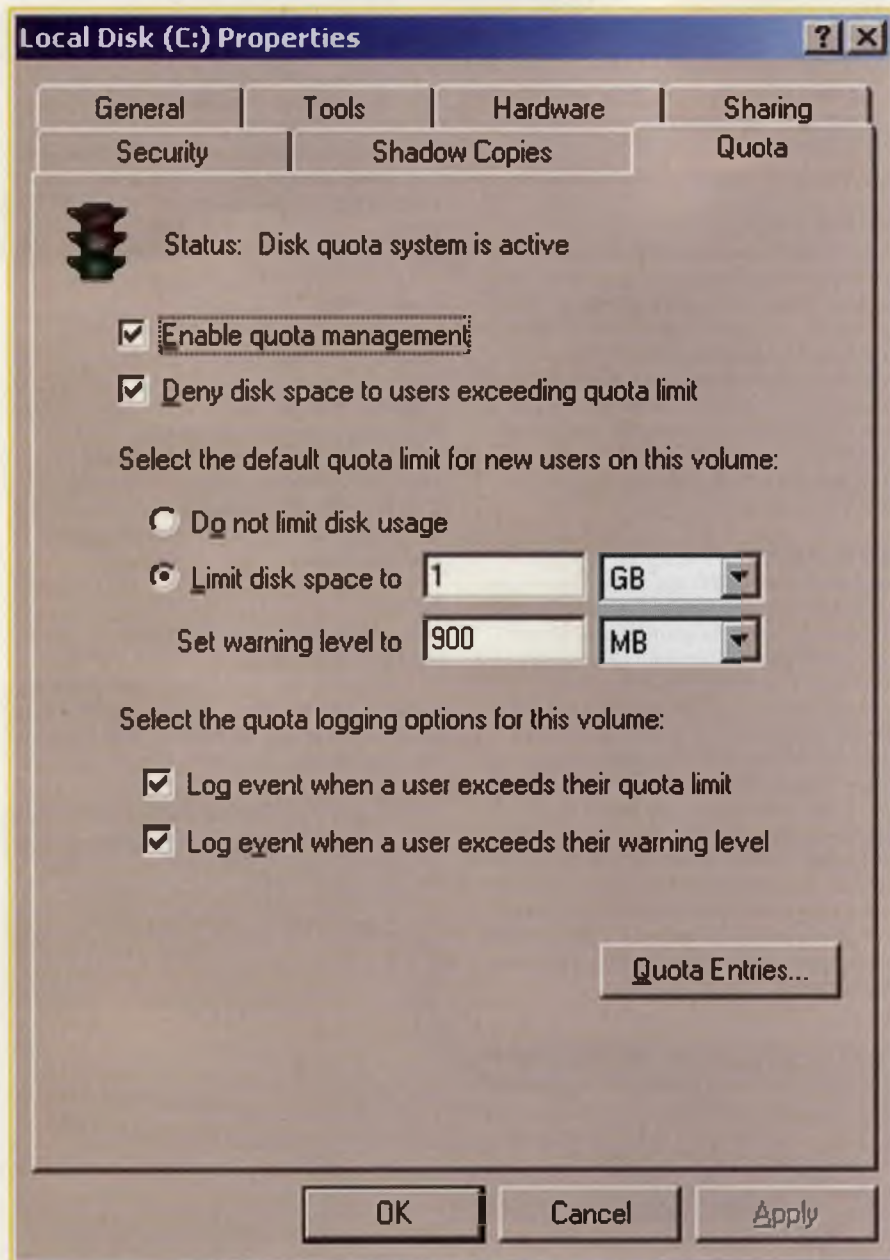
QUOTAS

After a while, you may receive complaints from some users that there is insufficient disk space available when they are writing data to a share — especially if the share is located on the system partition. By default, SBS enables disk quotas on the system partition to ensure that users cannot



Can spam: using a DNS Blacklist service is one way to quickly reduce the amount of spam accepted by Exchange.

Duelling permissions: if users can't access data on a share, review both file-system and share-permissions entries.



Take it to the limit: SBS enforces quotas on the system disk in order to manage disk space. However, this can cause insufficient disk space errors for users.

workstation once it has been added to the domain (assuming that the appropriate wizard was used). Therefore, if you have a fax modem hooked up to your server and it's properly configured, sending faxes should be trivial.

Backups

The key to effective backups is to ensure that you are backing up all of the data that you need as frequently as you require (and that you know how to restore it if required). As mentioned previously, it's easier to find what you need to back up if it is stored in a managed way on the server.

Another way that you can force users to save things on the server is to use 'Configure My Documents Redirection' (which you can do from under the Backup section of SMC). By doing so, when a user creates a file under My Documents, it is written to their directory under the Users share on the server (or another configurable location), instead of under Documents and Settings on the local system. The added advantage of providing a common set of My Documents folders to your users, regardless of which PC they log on to, is a bonus.

The Configure Backup wizard should be executed to create or make modifications to your backup schedule. The first step of the wizard searches for a tape drive — if you don't have one, you should definitely store your backups in some location other than on the server. The cheapest, flexible storage media is via hard drives in USB enclosures.

The wizard will bring to your attention various settings that you may not have considered before, including how long deleted items are retained for in Exchange, or whether shadow copies of user data should be retained (allowing your users to revert to previous versions of their documents).

Vista, Office 2007 and SBS

It has recently come to our attention that there are a number of compatibility issues when using the 'Set up Client Computers' wizard when deploying Windows Vista or Office 2007 clients with SBS. A number of hotfixes for these issues is available at <http://support.microsoft.com/kb/926505>.

NEXT MONTH

- Next month's Masterclass details the spice that makes things nice — setting up a centralised update service, VPN connectivity, version control system and various scripts that will keep your server and users happy.

store excessive amounts of data (and to minimise the chance of the system drive filling up). By default, each user is limited to writing 1GB of data to the system partition. Essentially, this is one of the main reasons why user-accessible shares should not be located on the system partition. You can review the quota configuration of a drive under the Quotas tab of that drive's properties dialog, accessible by right-clicking on the drive in Windows Explorer and selecting Properties.

Shared faxing

If you have a fax modem available to connect to your server, you can configure SBS to send and

receive faxes without having to worry about the amount of paper that you use. The most critical step of the Configure Fax Services wizard controls how incoming faxes are routed. You can choose any number of the following routing methods:

- Forwarded by email to an email address, distribution list or public folder
- Stored in a directory on the file system
- Stored on the SharePoint Services web site
- Printed out

As was the case with Outlook, a shared fax client should automatically be installed on a

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Tweak your BIOS

Improve your computer's performance by optimising your Basic Input Output System.

REQUIREMENTS

● A PC

So you can access your BIOS, which you can enter by rebooting your computer and pressing the BIOS setup key, which is Del in most cases.

Most people only enter their PC's BIOS when they need to change the boot sequence or for troubleshooting. This is understandable, as it's not necessarily the most exciting part of your PC, but in ignoring it you could be missing out. With some intelligent BIOS editing you could improve your system's performance at no additional cost.

1. ENTERING THE BIOS

To enter the BIOS setup utility, you'll need to reboot your PC and press the key or key combination displayed in the early boot screens. This is often Del and sometimes F2 or F12, but there are other variations.

2. NAVIGATING

Most BIOSs look fairly primitive compared to operating systems, showing simple text-based screens with a limited number of colours. Some support mouse input, but it's far more common to navigate simply using the keyboard. Most commonly you move between options using the

arrow keys and select using the enter key. However, there are some BIOSs that use page up and page down to alter options. Esc generally takes you back one level or cancels the selected option. The initial screen provides you with a number of sections that allow you to alter further settings. Depending on the BIOS manufacturer, these sections may be displayed across the top of the screen or arranged on the welcome screen.

3. STANDARD SECTIONS

The 'Standard CMOS Features' contain basic settings like system time and settings for hard drives, floppy drives and CD/DVD drives. It's the most commonly configured area of the CMOS setup utility. 'Advanced BIOS Features' contain advanced configurations, like SMART capability, RAID settings and Boot virus protection. You're most likely to use this section to alter your boot device order.

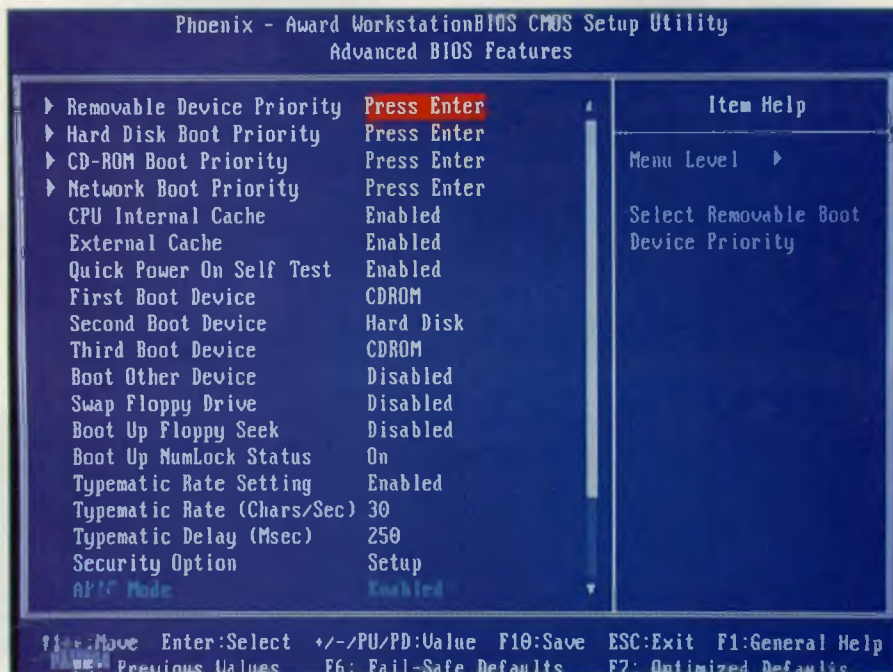
'Advanced Chipset Features' allow you to make various chipset alterations, including DRAM timing, the Video BIOS setting and several configurations of the AGP port. Go to 'Integrated Peripherals' to control the various ports of the computer, including IDE, USB, Serial and Parallel ports. You'll also find settings for onboard sound, video and networking here, if present. To conserve power you can specify settings in 'Power Management' to slow down or shut down components after a set idle time.

If you have a section called 'PnP/PCI Configuration', you can alter settings for the motherboard's PCI slots here and tweak its plug-and-play capabilities. The 'PC Health Status' section shows you your processor's fan speeds and temperature. You can elect to shut down the PC if it exceeds a set temperature.

4. DEFAULT SETTINGS

You may also see a number of standard options arranged on the main setup screen. These don't provide access to other sections but let you quickly apply simple changes. For example, 'Load Fail-Safe Defaults' allows you to return to a working configuration. 'Load Optimized Defaults' provides you with a set of settings for enhanced performance. You can use this to improve performance, but they aren't

Most people only use the BIOS to change the boot sequence, but you can use it to achieve a lot more.



DO THIS...

POWER SAVING

Although you can change power schemes in Windows to save energy, it's usually much more efficient to enforce power saving in the BIOS. Some BIOSs include a specific power management section. Otherwise you may find these options under 'PC Health' or 'Environment'. There may be some generic power-saving options, but you should be able to make more specific edits, too.

Change the PM Timers to set the waiting period before the PC powers down its hard drives or goes into Suspend or Doze mode. Choose 'Power

Management' from the main BIOS menu. If you have a 'Global Power Management' setting, set it to Enabled. Other settings allow you to specify what components power down when the system is idle. Select the 'Power On Function' to specify what action will restore power. You can assign this to a hot key, use a password, or opt to restore power when any key is pressed.

There are a number of energy-saving options that you can enable with the BIOS.



necessarily the optimum settings, which is why it's a good idea to get to know the functions of each section of the BIOS.

5. OPTIMISING THE PROCESSOR

A common optimisation that you can apply in the BIOS is overclocking the processor. With the right tweaks you can push your PC's performance a little beyond the designed limit of your CPU, but it's important to exercise extreme caution when doing this. It's achieved by altering the frequency or frontside bus (FSB). You will normally find this in a section called 'Frequency/Voltage Control', although some BIOSs have separate sections for the processor settings.

6. SETTING YOUR MEMORY TIMINGS

It's also possible to improve performance by tweaking memory timings. The results are more significant with older RAM types, but you can still make a small difference by optimising these. From the main BIOS screen, select 'Advanced Chipset Features', where you'll be able to tweak your RAM settings. Select 'Memory Timings' and press Enter to input your own timings here. You need to aim for low CAS latency and low RAS-to-CAS delay. Low Bank Cycle Time is desirable and RAS precharge has a small effect on performance. Go back to the main menu and select the RAM voltage setting. Increase the voltage in small increments and treat it with the same caution that you would when overclocking a processor, using the 'PC Health' section as a guide to temperature and carefully check stability with each change. It's worth going over the main memory timing settings that you might encounter so you have some idea of how to modify them for better performance.

7. GETTING THE OPTIMUM CAS LATENCY

There are several parameters that determine memory timing. The most important one is CAS latency: this stands for Column Access Strobe

and manages how quickly memory units can return a response to a data request.

Typically, it's set at two or three in SDR RAM. In DDR RAM, it's generally set at between two and 2.5. The numbers refer to the number of clock cycles taken up in the delay. A lower number is better, since it denotes a shorter delay. Setting the CAS latency to two in SDR RAM can produce marked improvements. These aren't as noticeable in DDR RAM; you'll notice higher latencies in DDR2 and DDR3 RAM — this is normal. While the number of memory cycles has gone up, the actual latency time in nanoseconds is lower. Expect to see CAS latencies ranging as high as between five and 10 with newer RAM. Because the duration of the memory cycle is shorter, you'll find making changes here results in a much smaller change in performance.

8. IMPROVING BANK CYCLE TIME

Bank Cycle Time, or tRAS, is the number of clock cycles needed to create the complete difference in charge between the bit and lines of reference to restore the data in the cells of memory. Lower settings are faster because it means fewer clock cycles are needed. Typical settings are seven, six and five.

Moving on, tRCD or RAS-to-CAS delay is again measured in clock cycles and can limit memory performance. A lower setting provides a faster speed. RAS precharge or tRP has similar settings to the RAS-to-CAS delay but has little or no effect on performance. The 'Bank Interleave' setting determines whether the memory is interlaced or not. By default, most RAM isn't interlaced, but by setting bank interleaving to two-way or four-way, you can increase efficiency considerably. Without interlacing, your memory

has to wait for each latency delay before it can do anything. By doubling up the memory that can be active at the same time, you reduce the effect of these delays.

9. GRAPHICS CARD PERFORMANCE

You can make some performance gains with your graphics card in the BIOS, depending on the kind of adaptor you use. These settings are generally found under 'Advanced Chipset Features', but, as always, BIOSs vary. For PCI Express cards, you may be able to modify the 'Maximum Payload Size'. This is the quantity of data that's sent in each PCI Express packet. It's generally arrived at automatically by the system, but you can ensure it's at an optimum by setting it to the maximum value available. If you still use an AGP graphics card, you may be able to tweak the AGP aperture size. This is the amount of system RAM allocated to the AGP for video purposes. You can set this to up to half your system RAM, although values above 128MB are unlikely to provide a huge improvement.

You can also investigate enabling 'AGP Fast Write Transaction' where available. This allows data to be sent directly from the chipset to the graphics card without making a copy in the system memory for the graphics card to fetch.

10. MISCELLANEOUS IMPROVEMENTS

In older systems you may find some advantage in allowing fast boots or choosing a quick power-on self-test, as this speeds up boot time, but most recent PCs already include this optimisation. It's also worth checking your USB 2.0 controller mode. If it's set to full speed, change it to 'HiSpeed', as this provides a significantly better data rate. 



WITH THE RIGHT TWEAKS YOU CAN
PUSH YOUR PERFORMANCE BEYOND
THE DESIGNED LIMIT OF YOUR CPU



Make Vista more secure

Tim Anderson shows you everything you need to know about Microsoft's new security features.

REQUIREMENTS

• WINDOWS VISTA

We've tried to ensure you'll get something from this tutorial with a broad spectrum of versions. So, even if you've not got the more-expensive Ultimate versions of Vista, read on.

The Protected Mode caption at the bottom right of the Internet Explorer window means IE is running with low permissions, for safer browsing.

When you log on to a Windows PC running NT or higher, the OS issues a token that defines what permissions you have. Vista is different; if you log on as an administrator, which is the default for the first defined user, Vista issues two tokens. One is for a standard user with limited rights, and the other a full administrative token. When applications are executed, they run with the standard token unless specifically promoted to the full token, a procedure called elevation.

This standard token has several restrictions, including the Windows directory, Program Files and The HKEY_LOCAL_MACHINE section of the registry being read-only. Also, your ability to modify the system or interact with system processes is restricted.

When you need to launch an elevated process, Vista will prompt for consent. The prompt itself is a potential security hole, since the Windows API allows applications to communicate. What's to stop some virus auto-clicking the Allow button? Vista prevents this by showing the prompt on a different 'desktop', called the secure desktop. In Windows, a desktop is a security boundary that prevents interaction. Unfortunately the side-effect is an

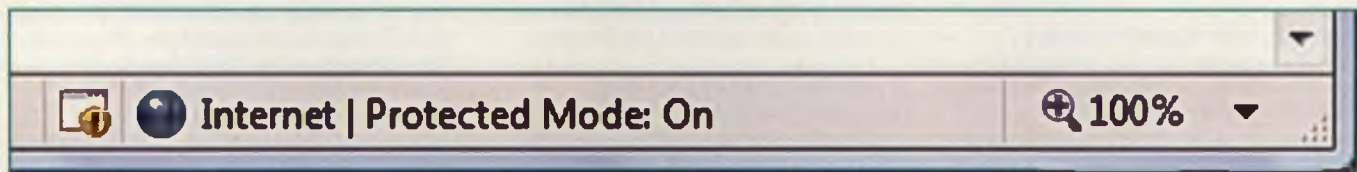
HANDY TIP

Attentive users will notice that the UAC elevation prompt appears in various colours. These are based on the publisher of the application that is trying to run, as identified by its digital signature. A red band indicates a blocked publisher. Green is reserved for Vista's own applications. Grey signifies a signed application, while orange is for executables of unknown origin.

ugly screen flash, but without it UAC would be less secure. Presuming you grant consent, the application is then launched with the administrative token and can do what it wants.

UAC VIRTUALISATION

UAC is designed with one eye on security and the other on compatibility. Had Microsoft concentrated solely on security, too many applications would have broken, and users would be tempted to revert to running with full rights. Therefore, there is a compatibility feature called virtualisation, which kicks in when an application running with standard rights tries to



HOW TO FIX VISTA'S NETWORK BOTTLENECKS

JAMES BANNAN NOTICED VISTA STRUGGLING WITH SOME ASPECTS OF NETWORKING. HE PROVIDES HIS FIX.

While using Vista, I noticed it made heavy weather of some networking activities. I just assumed that Vista's beefy network stack was responsible and made a mental note to fix it at some point. And then forgot.

But recently I encountered a really frustrating problem. Using Remote Desktop Protocol (RDP) to connect from a Vista Enterprise machine to a Windows 2003 server, the performance was so woeful that I was starting to worry whether there was a problem with the server.

As it happens, my fears about the server were unfounded, but the thought that Vista's networking stack was to blame turned out to be correct. The Next Generation TCP/IP stack in

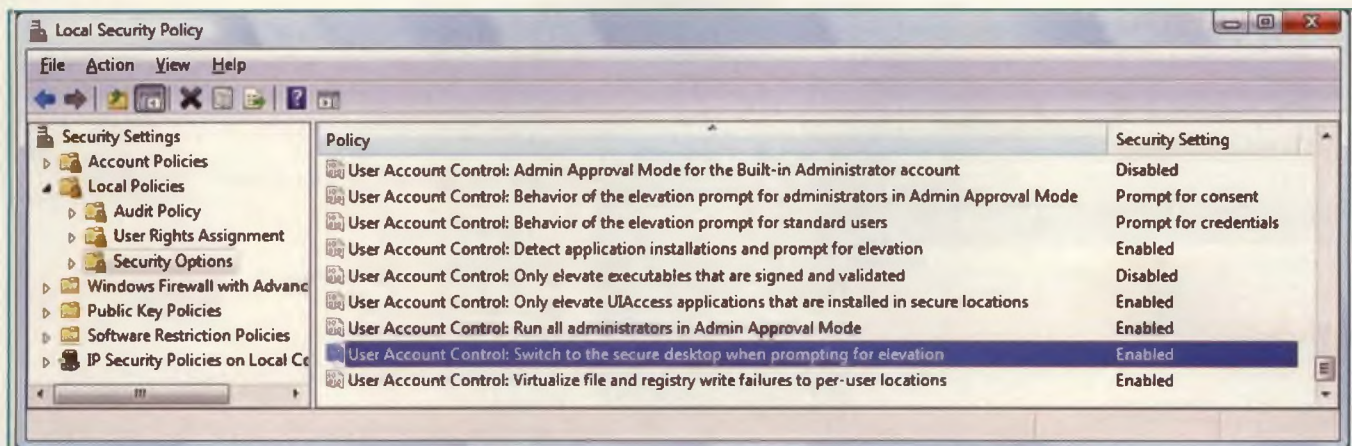
Windows Vista supports something called Receive Window Auto-Tuning. This is nothing to do with the RDP 'window' you see on the screen but rather a TCP buffer which TCP/IP clients use to ensure smooth transmission.

Essentially, the TCP receive window is the amount of data that is sent in one chunk before waiting for an acknowledgement to come back from the machine at the other end. It's one of the trickiest things to optimise in TCP/IP because you need to balance throughput with reliability – if you transmit too much data in one go, if there is an error in the data flow, the whole lot has to be sent again. Windows XP was originally tuned for dialup connections (lots of errors, so very small chunks of

data were sent), but this caused performance problems on high-speed broadband networks.

In XP SP2, Microsoft increased the receive window value for better performance on broadband, but it's still not optimal for many situations.

Vista is supposed to improve on this situation: Vista has a new feature called 'Receive Window Auto-Tuning' which constantly monitors bandwidth capacity and latency and adjusts the TCP window on the fly for any given situation. It also enables TCP window scaling – by default the maximum TCP window size is 65,535 bytes, but window scaling allows a client to advertise that it's optimised to receive a bigger window than this – it's designed to prevent TCP window bottlenecks in high-bandwidth



Local Security Policy is where you fine-tune UAC, provided you're running at least Vista Business or Vista Home Premium.

write to an illegal location, such as the Windows directory. The write attempt appears to succeed, though in reality it fails. Windows redirects the write to an area called the virtual store, within the user's home directory. The virtual store is located at `C:\users\[username]\AppData\Local\VirtualStore` in a default setup. There is also a virtual registry, which works in the same way.

The virtual store is per-user and is only used by applications that are not elevated and not Vista-aware, but this can cause problems. Imagine you have an application that maintains a database in its directory in Program Files. You run the application as standard user and make some updates. Then you log off, and another user logs on and makes some more changes. There are now three versions of the database on the system, yet there only appears to be one. This has obvious potential for bugs. The point is that virtualisation is a compatibility feature — it's not intended for long-term use.

INTEGRITY LEVELS

A little-known feature of UAC is called integrity

levels. This is another approach to the problem mentioned above, where an application can escape its sandbox by communicating with an elevated process. Vista tries to prevent this with a hierarchy called integrity levels. Each process is assigned one of four integrity levels, from low to high. A process has only limited ability to interact with processes running at a higher integrity level.



UAC IS A CONTROVERSIAL FEATURE: PRE-RELEASE USERS DISABLED IT FOR THE SAKE OF THEIR SANITY

Provided UAC is enabled, Internet Explorer 7 runs at the lowest integrity level. This is called Protected Mode and reduces the risk of drive-by malware getting installed while you browse the internet.

UAC is a controversial feature. In pre-release versions of Vista, the elevation prompts came so thick and fast that users disabled it for the sake

of their sanity. Others say it's not secure enough, because a single click grants administrative rights, whereas on the Mac or Linux you typically have to enter a password.

FINE-TUNING UAC

Fortunately, UAC is configurable. You can turn it off altogether with an option in Control Panel > User Accounts. Doing so isn't recommended but

it does improve compatibility with XP, slightly improves performance and means you'll never be troubled with elevation prompts.

Fine control is available in Control Panel > Administrative Tools > Local Security Policy. In the left panel, select Local Policies, then Security Options. Finally, scroll down the right-hand side to see the User Account Control options.

environments. Vista's maximum advertised TCP window is 16MB.

Therefore, in a given situation, a Vista machine will typically receive much more network data than a Windows XP PC, which can result in network spiking. This isn't necessarily a problem in itself, but it does increase the importance of actually using TCP/IP QoS (Quality of Service), which is installed and enabled by default in Vista.

THE PROBLEM WITH VISTA'S NEW-FANGLED NETWORK STACK

All this automatic tuning of the Vista network stack sounds great in theory, but the problem is that some clients don't support TCP window scaling, or do but

don't have it enabled. Additionally, some firewall products also don't support it. In either scenario, the result is dropped packets, which affects network performance horrendously — your traffic is literally dropping into a black hole, never to be seen again.

So if you're experiencing excessive network lags on your Vista machine, especially compared to non-Vista machines, it might be worthwhile disabling auto-tuning. Do this by opening up an administrative Command Window (right-click, Run as administrator) and type in the following command:

```
netsh interface tcp set global
autotuninglevel=disabled
```

In addition to entering the above command, you may also need to type in:

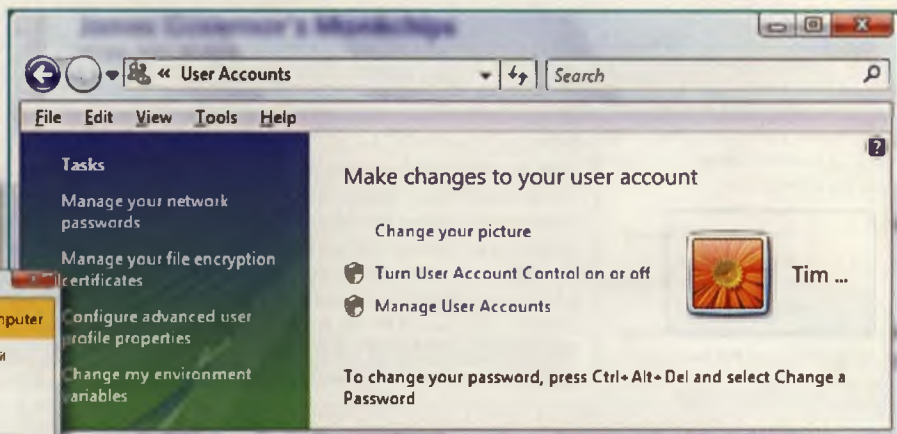
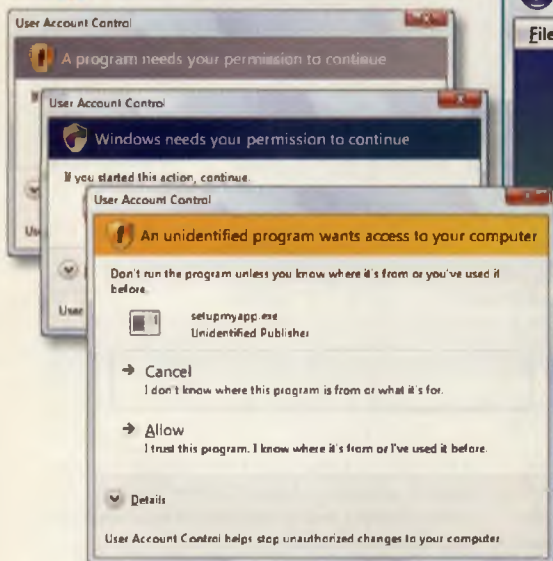
```
netsh interface tcp set global rss=disabled
```

The changes take effect straight away, with no reboot needed. Bear in mind that this is a global change, so it may really be worth your while to sit down and nut through your network's QoS settings to get things running happily without disabling auto-tuning.

Personally, I needed to RDP to that server as a matter of urgency, and disabling auto-tuning definitely did the trick.



If too many prompts are annoying you, you can fine-tune the UAC.



Kill UAC at a stroke and wave goodbye to most of Vista's improved security features.



YOU CAN TURN UAC OFF ALTOGETHER, BUT IT'S NOT RECOMMENDED TO DO SO

If you have Vista Basic or Home Premium, this editor isn't available. The solution is to edit the registry directly. There are nine options for configuring UAC. Note that the editor refers to Admin Approval Mode. Disabling Admin Approval Mode is equivalent to disabling UAC, but it's disabled by default for the built-in administrator account, the one you supplied a password for when installing Vista but never thought about again. This is so you can fix a broken Vista without the burden of UAC prompts.

There is a distinction between 'prompt for consent' and 'prompt for credentials'. If you choose the credentials options, Vista will require a username and password, or an alternative authentication method, before allowing elevation. Use this to tighten UAC security. You can also lock down UAC by restricting elevation to signed applications only. This is a great idea in theory, but there are lots of legitimate applications out there that are not signed.

If the UAC virtualisation is causing problems, it can be disabled here. Another option controls

whether the secure desktop is used for the UAC elevation prompt.

Finally, there is the setting 'Detect application installations and prompt for elevation'. Most setup routines require elevation, so this looks sensible. The catch is that Vista's technique for detecting installers is crude. It simply looks for the string 'setup', 'update' or 'install' in the name of the application, unless it's Vista-aware. This can be a security risk if some frequently used utility happens to be called UpdateData, for example, and gets elevated unnecessarily. That said, it's not really a flaw in UAC itself. Setup routines don't bypass UAC security automatically, as they still raise the elevation prompt.

DEVELOPING FOR UAC

User Account Control is a challenge for developers, because it changes the behaviour of Windows. In order to work smoothly with Windows Vista, there are three things every developer must do. First, respect Windows

guidelines for where applications write data. Normally that means somewhere in the user's home directory. Second, sign the setup routine and application. Otherwise, some locked-down desktops will not be able to run them. It also gives the user a better experience, as they can see who the publisher is. Finally, make applications Vista-aware. This is done by embedding an XML manifest as a resource. The manifest states what level of permission is required. System utilities can be marked 'requireAdministrator', while other applications should specify 'asInvoker'. Including this manifest disables virtualisation and controls whether or not the elevation prompt appears.

UAC is worth it. It's a clever compromise between making Vista too annoying to use on the one hand and failing to tackle Windows insecurity on the other. Don't even think about turning it off, but do make it work for you!

SPOTLIGHT ON...

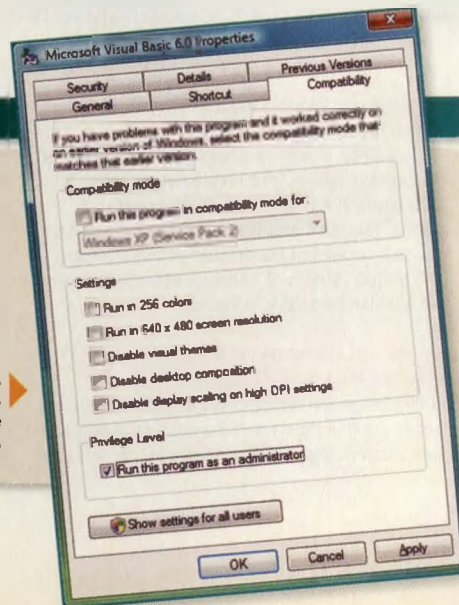
HOW SECURE IS UAC?

Microsoft admits that UAC is a compromise; there is potentially a big flaw in its security, which is that elevated and non-elevated processes run on the same desktop and in the same session. The integrity level system mitigates, but does not eliminate this risk. For example, malware writers may devise ways to write data to disk or to memory that an elevated process will read and act on. On the other hand, it's the ability to elevate processes within a session that makes UAC so convenient, and therefore less likely to get disabled. Microsoft's Mark Russinovich explains it like

this: "Why did Windows Vista go to the trouble of introducing elevations and integrity levels? To get us to a world where everyone runs as standard user by default and all software is written with that assumption." UAC in Vista is there to make applications behave better. Once they do, a future version of Windows can further tighten security.

Some older applications may require elevation.

For one-off usage, right-click and Run As Administrator will do the trick, but it's more convenient to edit the compatibility settings.





Dynamic Flash galleries

Justin Dike uses a Flash movie to show images, with simple URL strings to choose between files and folders.

REQUIREMENTS

ADOBE FLASH

Versions MX2004, 8, CS3 are all fine. You can download a fully functional 30-day trial from www.adobe.com.

A FOLDER WITH SEQUENTIALLY NAMED IMAGES

Mountain1.jpg, mountain2.jpg, etc.



Using Test Movie should, if all is correct, show you your first image.

Multimedia is one of Flash's most powerful and useful features. This tutorial will show you how you can set up a single Flash file (.swf) that will dynamically load a sequence of images, anywhere on your site, by simply changing query string variables. By using this technique, your image gallery can have a completely different set of images without having to republish the Flash file or even update a text file. The secret sauce is in those query string variables, as in 'www.mysite.com/page.html?variable=1'.

In the URL above, after the domain and page name, you'll see a question mark, and this is where your query string variables begin. In this example, the variable name is 'variable' and it equals '1'. If you wanted more than one variable, you would continue by typing an ampersand symbol between variables. For example, in our project, we will end up with two different variables, so the query string variable will look like this: 'gallery.php?filename=mountain&folder=images'.

When finished, our Flash gallery will load up images with a file name that begins with 'mountain' from inside a folder named images. It'll do it in sequence, too: mountain1.jpg, mountain2.jpg, mountain3.jpg and so on. And you will never need to rebuild the files.

PREPARING THE GROUND

Create a new Flash file in either Flash MX2004, Flash 8 or Flash CS3. In CS3, set Actionscript to version 2.0. Save the blank file as gallery.fla, and in the same directory, create a folder called 'images'. Put in a series of images, named as above — mountain1.jpg, mountain2.jpg and so on. These should be about 500 pixels wide, and low-res — 72dpi — to make them easy to download.

Back to Flash. Since this is a brand-new file, your timeline will have one layer and one blank keyframe. Name your layer 'Actionscript', then select that one blank keyframe on the timeline. We'll be writing Actionscript in that frame. From the top menu, go to Window > Actions (or hit F9). Your Actions window will open. Type the following line:

```
loadMovieNum("images/mountain1.jpg", 99);
```

From the top menu, go to Control > Test Movie. This tests the movie and creates for us the gallery.swf file. And if you have typed that line correctly and set up everything right, you should see the first image in your sequence, mountain1.jpg. That's a great sign that things are working, if simply by hard-coding the name of that image into our file. Ultimately, we don't want that, but this was just a quick test.

Let's talk about the number 99 in the loadMovieNum statement above. This could have been any positive number. We chose the number 99 because it stands out. It specifies the z-depth level that the image is loaded onto. You can think of your z-depth like transparent layers. The higher the number, the higher the layer in the stack. In this new project, everything will use 99, which means that any new images which are loaded in will simply replace their predecessors.

SETTING IT FREE

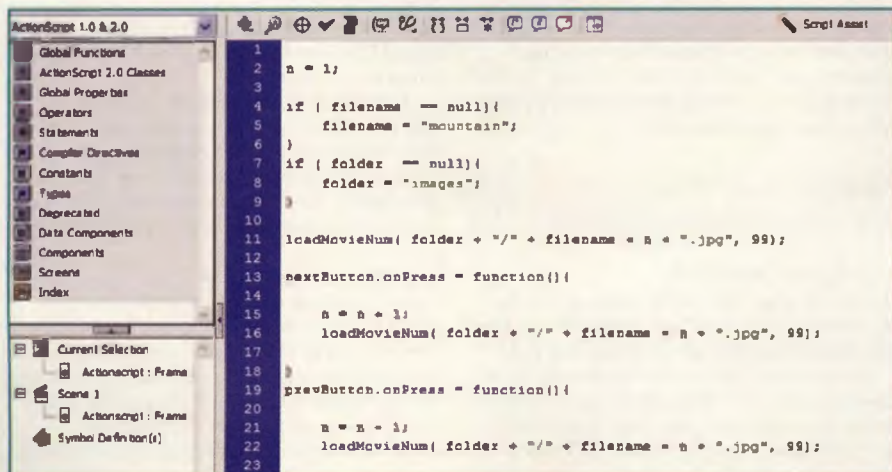
Now we alter our loadMovieNum statement so we aren't hard-coding the file name. Change your Actions Panel to read:

```
n = 1;
loadMovieNum("images/mountain" + n + ".jpg", 99);
```

Go to Test Movie, and you should see the same result as before. In fact, the image that loads will depend on the value of the variable n. Try setting n to 2, and the next image will load instead. Now we know everything's working, wipe your Actions panel clean again, and type this:

```
n = 1;
filename = "mountain";
```

In Flash CS3, the script for producing the .swf and .html files for your dynamic Flash gallery project will look something like this.





```
folder = "images";
```

```
loadMovieNum( folder + "/" + filename + n +  
".jpg", 99);
```

Test the movie, and everything should work as before. If so, you're off to a great start. By the end of this project we'll use query string variables to determine the names of which image sequence and folder to load from. For testing purpose, we've just hard-coded in those variable values. With a couple of if statements we can set up the gallery so that it will only fall back on these defaults if it hasn't been told differently via a query string variable:

```
if ( filename == null){  
    filename = "mountain";  
}  
  
if ( folder == null){  
    folder = "images";  
}
```

QUERY STRING VARIABLES

From the top menu go to File > Publish. This creates two files for us, gallery.html and gallery.swf (which we had before with Test Movie). Rename gallery.html to gallery.php and open it up in any text editor. The chunk of embed code you'll see was automatically created by Flash, and we can largely leave it alone. We just need to make a couple of quick changes to add our string variables. Add the following to the top of the document:

```
<?php  
$folder = $_GET['folder']; $filename = $_  
GET['filename'];  
?>
```

This code gathers up the PHP variables we will assign to folder and file name. When we're finished, this will take the form 'gallery.php?filename=mountain&folder=images'. Note that PHP variables begin with the dollar sign. If we typed into our browser that URL with the query string variables, gallery.php now has two variables floating around. The trick is to make it so that our published Flash file, gallery.swf, receives those two variables too. Edit the embedding code, changing all occurrences of 'gallery.swf' to:

```
gallery.swf?folder=<?php echo $folder  
>&filename=<?php echo $filename ?>  
GET['filename'];
```

In PHP, 'echo' is used to write into the HTML. The first writes in the value of \$folder, the second, \$filename. And with that simple tweak, we're almost done tinkering with gallery.php.

If you've published this file from Flash CS3 or if you published from Flash 8 after applying a new HTML template to publish with the corrected embed code for those pesky Active Content changes in IE a while back, then you have one more step to do. Search out these two code snippets... 'src', 'gallery'... and... 'movie', 'gallery'. Where 'gallery' is written, after the letter y and before the single quote, add:

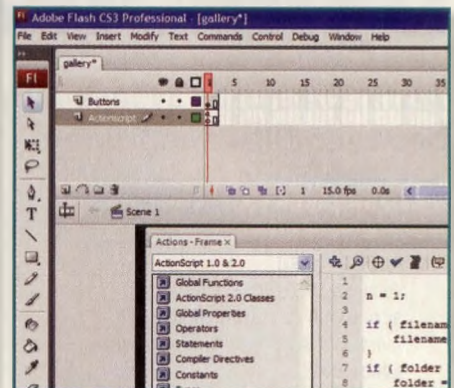
```
?folder=<?php echo $folder  
>&filename=<?php echo $filename ?>
```

ADDING THE CONTROLS

The last thing we need to do is hop back inside our Flash file (gallery fla) and add buttons so that we can progress through our image sequence.

Create a new Layer on the Timeline. To be tidy, label it 'Buttons'. For now, just use basic symbols: a triangle or similar on either side. Select each in turn, then go to Modify > Convert to Symbol.

Query string variables determine which sequence and folder to load from.



Where to write your script for your project in Flash CS3.

You'll be prompted to pick a symbol type. Choose Movie Clip, and type in any name.

Once created, the movieclip should be selected. Go to your Properties window and look for a field called Instance Name. Call it nextButton. We can now give that movieclip some properties using Actionscript by referring to it by its name, nextButton.

Return to the code we wrote earlier and, underneath, enter:

```
nextButton.onPress = function(){ n = n + 1;  
loadMovieNum( folder + "/" + filename + n +  
".jpg", 99);  
}
```

Now, when you press the button, it will load the next image. To create a back button, repeat the process, but call it prevButton, and subtract 1 from n.

This means that when you press that nextButton movieclip, it will run the function above. The loadMovieNum statement is the same as the initial one run in the file, but the only difference is that in the line prior, we've added 1 to the value of n. So it loads the next image in the sequence.

And with that, we're good to go. Don't test it on your PC — if you do, you'll only get an error. First, you've got to upload everything to your web server — gallery.swf, gallery.php, and if you've got a folder called Scripts, that as well. Try it out now, with some different folders and image sets.

UNLOADING THE GALLERY

If your Flash page contains more than just this dynamic gallery, for example, a separate section, then you'll need to unload the images when you jump to another part of the .swf. Calling this new section simply 'another_section', add the code below. The unloadMovieNum statement completely removes the content that was loaded

DO THIS...

PREVENT CACHING

If you update your site a lot, you may want to force the page to refresh itself each time a viewer visits, so your new content is always included. Otherwise the page information may be pulled from the browser's cache (or temporary internet items folder). To do this, place a question mark, ?, followed by a number on the end of the link URL. For example. . .

```
<a href="yourPage.html?1">Your Page</a>
```

To make that number unique every time the page loads, you can replace it with a randomly created PHP value. For example, you could use this code:

```
<a href="yourPage.html?<?php echo rand(0, 10000); ?>">Your Page</a>
```

This quick rand statement generates a random number between 0 and 10,000. It's unlikely to be the same twice in a row!



Ensure users see your latest updates by avoiding caching.

at the z-depth level 99 — in this case, any images that have been loaded.

```
gotoAndStop ( "another_section");
unloadMovieNum( 99 );
```

OTHER LOAD LOCATIONS

In this gallery project we load our image into a z-depth layer of Flash, which is like the invisible 'ether' of the movie. There's thousands of these invisible layers, we just chose _level99 because it stands out numerically. You can obviously experiment with loading multiple movies at once on different levels, but you can also choose a movieclip to be replaced by your loaded object, instead of placing it on a z-depth layer. This is often helpful if you want to create an empty or 'alphaed out' movieclip and use it as a placeholder in your project file.

To try this out, create a square (preferably with an alpha value set to 0), and convert it to a Movieclip. When prompted to give the Movieclip a name, check to be sure your Registration Point settings are aligned to the top left. This way your loaded image or .swf will be placed at the top left of your placeholder movieclip. Next, select the newly created square, and in Properties give it an instance name of loadTarget. Then — on your Actions layer — use the following piece of code:

```
loadMovie ( "mountain1.jpg", "loadTarget");
```

As soon as the image has fully loaded up, it will replace the instance on stage called loadTarget.

You can then change properties of your loaded clip by referring to its instance name. Examples include the first two lines. When finished, the unloadMovie command would look like the bottom line:

```
loadTarget._x = 500
loadTarget._width = 200
unloadMovie ( "loadTarget" );
```

CHANGING PROPERTIES

To fine-tune properties of your loaded images you can change their location, size, or rotation after they have loaded in. If you loaded the content to a z-depth level of 99, try the first line, or if you loaded the content in place of a movieclip instance called loadTarget, then the code would be the second line:

```
_level99._rotation = 35; loadTarget._rotation = 35;
```

Some of the most common properties are _x, _y, _rotation, _xscale, _yscale, _width and _height. The _x and _y values adjust their location on stage; you can use negative or positive numbers and generally you'll want to keep the range of these values within the size of your document. The _rotation range is 0 to 360. A value of 180 would flip the image upside-down. The _xscale and _yscale values are by default at 100 per cent. This line will change it:

```
loadTarget._xscale = 90;
```

This would make the horizontal width of the loaded image 90 per cent of its current value. In most cases, you'll want to adjust the _xscale and _yscale values uniformly to avoid distortion.

CREATING AN IMAGE LINK

If you want to dynamically create a button out of one of your images, it is best to use the movieclip placeholder method to load the image. Simply replace a movieclip instance called loadTarget, then run the following code:

```
loadTarget.onPress = function(){
    getURL("http://www.yoursite.com", "_blank");
}
```

In the getURL statement shown above, _blank is written so that the browser will open the URL in a new window. If you had written _self instead, the browser would load the URL in the current window. If you want each image in the gallery to link to itself, you could write this:

```
loadTarget.onPress = function(){
    getURL ( folder + "/" + filename + n + ".jpg",
        "_blank");
}
```

This would be a good way to allow viewers to download a copy of the JPG they are seeing — with a regular Flash gallery, users can't access the actual image files the gallery is displaying. **ETTC**

DO THIS...

ADD A FADE TRANSITION

To make an image fade in after clicking to load, it doesn't take much. Just load the image using these lines of code:

```
loadMovieNum( folder + "/" + filename + n +
    ".jpg", 99)
```

```
new mx.transitions.Tween( level99, "alpha",
    mx.transitions.easing.Regular.easeOut, 0,
    100, 2, true);
```

This will take the loaded image at _level99 and change its alpha value (transparency) from 0 to 100, over the course of two seconds. To decrease or increase the time it takes to fade in, change the value of the number before the word 'true' in the code. You can also tween more than just the alpha value. Try replacing 'alpha' with _x, _y, _rotation, _xscale, _yscale, _width, or _height. You can experiment with changing these values until you get the perfect effect.



Various factors allow you to control fade transitions between images.



Edit photos online: free!

Use the new wave of web-based image editors to tweak photos or create pictures from scratch. *Karl Hodge* shows you how.

REQUIREMENTS

● A WEB BROWSER

You'll need this to sample the online image editors we've selected to go through this issue.

A mass of office productivity software has found its way online. Word processors, calendars, contacts, email — their natural home seems to be the internet. Strangely, though, they weren't the first desktop tools to make the leap to the web. That honour goes to image-editing applications. Early examples included JPEG and GIF optimisation tools, with rudimentary editing features.

Adobe has announced that they'll be launching an online version of Photoshop. The advertising-supported application will be entering a thriving market, with a growing base of free-to-use image-editing tools. We've sampled a few, and we'll take our favourites on an extended feature tour, pointing out the idiosyncrasies that tripped us up on our first encounter.

IMAGE EDITORS

Our first pick, Phixr (www.phixr.com), isn't the prettiest of the online photo-editing services, but it boasts a richer feature set than most. The emphasis here is on photo manipulation and editing rather than image creation, with a series of easy-to-apply tools. The workflow is predictable too: hover over an icon to find out what it does, click the icon to get a preview of the effect, alter parameters then apply. It's well-suited for web images, but can even save PDF format files.

The clean-looking [pixer.us](http://www.pixer.us) (at www.pixer.us, predictably) has a lot in common with Phixr,

concentrating on quick photo manipulation tasks. The interface is a little slicker, with crop and resize tools benefiting from a Web 2.0 makeover that makes other entries in this category look a little clunky. Again, web formats JPEG, GIF and PNG are catered for when saving images — and there's Microsoft BMP support too. For fast editing, there's little to choose between these two.

Snipshot (www.snipshot.com) has fewer features that we've included here, but has one that's truly impressive: dynamic resizing. Most other tools prompt you for numeric input or use sliders; in Snipshot you drag handles to resize an image and can then place it anywhere in the document space before using the crop, enhance or rotate tools. Finished images can be saved to standard web formats as well as Photoshop-compatible PSD files.

TOP PRODUCT

Fauxto really stands out as the closest you'll get to having Photoshop online until the real thing comes out later this year. Flash-powered, this is the only application with a tool set that allows you to create new images as well as manipulate and edit existing ones. The resemblance to Photoshop is remarkable, with support for layers, a range of familiar filters, text and drawing tools. Surprisingly, you're restricted to only two file formats when saving though: JPEG and PNG. These are fine for web work, but reduce its credibility as a true alternative to desktop editors.

FAUXTO DOCUMENTS

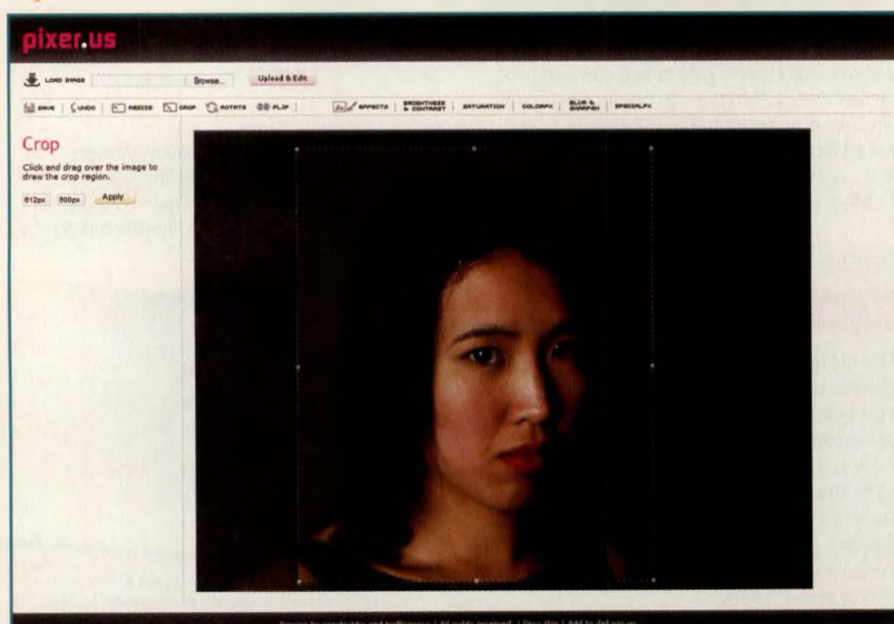
Fauxto still has plenty of other features. We can go through its unusual workflow by creating an example image. You'll need to start up your browser and navigate to www.fauxto.com. First steps: click 'Sign Up' and create a login name. Click 'Edit Image' when your account has been confirmed.

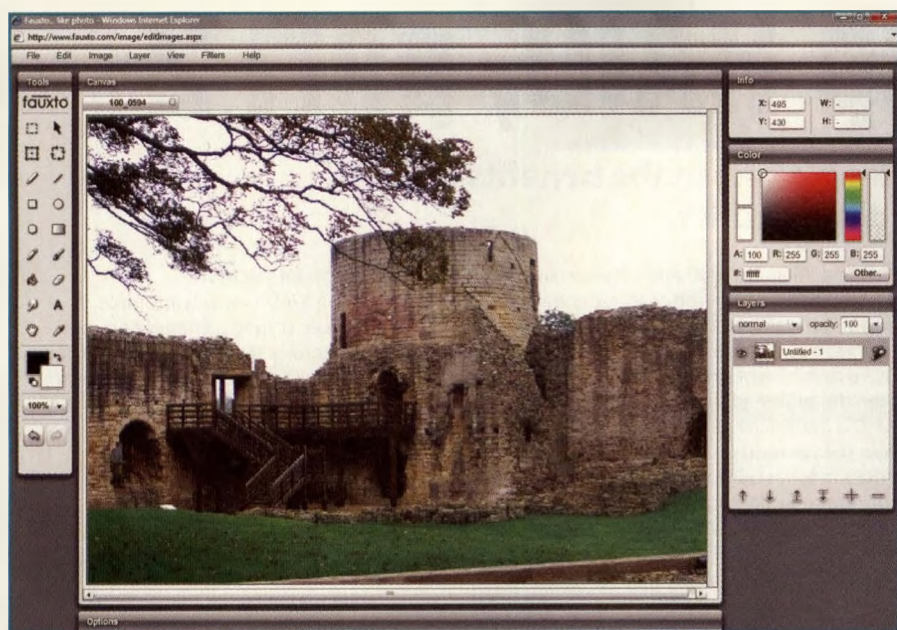
We're going to make a simple logo image and explore some of Fauxto's tools along the way. Go to File > New and give the new image the name 'Logo' in the dialog that appears, accept the default dimensions and click OK. The result is a new document with a transparent background.

Go to the Layers palette and select the text 'Untitled-1'. Change this to read 'Background'. Unlike Photoshop, layer text is always editable without double-clicking or invoking a command from a context-sensitive menu.

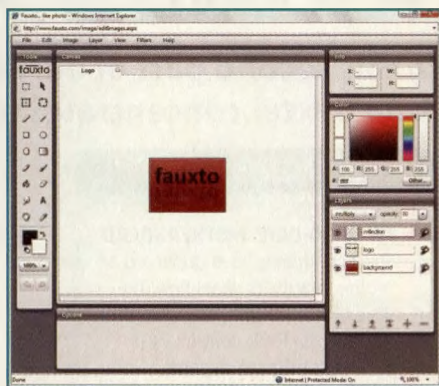
To add some text to the document, choose the text tool in the Fauxto tools panel and you'll find the unusual workflow first rears its head. The

Pixer's Web 2.0 styling hides a useful set of features and can save PDF format files. A premium version is in the pipeline.





Be careful when applying text or transformations in Fauxto. A double-click will create two new layers, not one.



Fauxto saves to its native *.fto format locally, so you can come back to an image and work on it later.



FOR NOW, FAUXTO REALLY STANDS OUT AS THE CLOSEST YOU'LL GET TO HAVING PHOTOSHOP ONLINE

Options panel at the bottom of the screen changes to a checkerboard background. Click here and type in 'fauxto'. Highlight the text in the Options panel to change its colour, font face and weight. We chose Arial, 48, bold. To add the text to your document, click once in the main canvas. Only click once, or you'll add multiple versions of the same text, each on its own new layer. If that happens, you can select 'Edit > Undo'.

With the text on the canvas, click the Move tool in the Fauxto tools panel. This is the default arrow icon. Hover over the text until the cursor turns to a four-sided arrow and position the logo in the centre of the canvas. When you've finished, click Apply Move in the Options panel. Rename the layer 'text'.

RASTERISING OBJECTS

Text remains editable in Fauxto after it's been placed. Click the text tool again, make changes to

any of the parameters and these are applied to the text on the canvas. We want to add more text though, so — with the 'text' layer selected — go to Layer > Rasterize to change the text to a bitmap. Now you can reselect the text tool and change the text without affecting the existing 'text' layer.

This time, leave the weight and face of the text the same but pick a lighter colour for the text. Once again, click on the canvas to place the text in a new layer. Use the move tool to position the new text under the first text block, then click the Free Transform icon. With this tool active, drag down to flip the text vertically. Reposition it if necessary to look like a reflection of the original, clicking Apply Transformation in the Options panel when you're done. Rename this layer 'reflection' and we can move on.

Finally, select the background layer in the Layers panel, then choose the Gradient tool. Go to the Options panel again and click any of the

colour swatches in the gradient preview. Double-click on the large swatch to open the selector. Choose a colour from the colour wheel, using the slider on the far right to set its alpha transparency. In this way you can create gradients that run from solid colour to full transparency — with elements visible through the fill. For now, just click and drag on the canvas to add the gradient fill to the background layer.

With the gradient in place, select the 'reflection' layer and rasterise it. With this layer still selected, open the Blend Mode drop-down menu and choose Multiply. Finally, set the opacity of the layer to about 60 per cent so that more of the background shows through.

Before saving the file, crop it down to size. Select the Marquee tool and drag around your logo to make a selection. When you're happy with it, go to Image > Crop.

At this stage in their evolution, online image editors aren't quite up to desktop standards — as Fauxto's quirky workflow shows. They're fine for simple editing jobs, quick tweaks and web work, though. But that could all change very quickly once the online version of Photoshop finally gets its release. **FTIC**

DO THIS...

EDIT PHOTOS WITH PICNIK

Picnik (www.picnik.com) differs from Fauxto and most desktop image-editing tools in that it provides users with a simple collection of photo correction features; it has more in common with Google's Picasa than Photoshop. You can explore the site's features using sample photographs, once you've created a free account.

Flash-powered and easy to use, its main features are accessed through a series of tabs. The Editing section offers standard resizing, rotation

and crop tools and red-eye removal. There's an extensive effects section and the widest support for image formats of any of the tools we've looked at. You can also add edited images direct to Flickr and Facebook. This flexibility comes at a price; it's still in beta and seems a bit buggy, freezing on Vista a couple of times while we were using it.

Online photo editors aren't suitable for pro work, but are fine for a nip and tuck.





Setting up RAID, part 2

In this second part of our series looking at the benefits of RAID, *Alan Dexter* concentrates on data security.

REQUIREMENTS

● AN UP-TO-DATE MOTHERBOARD

RAID controllers have appeared on motherboards for years now. The likes of Intel, Nvidia, AMD and VIA all integrate RAID controllers in their motherboard chipsets.

● A PAIR OF HARD DRIVES

A matched pair of new drives, while not essential (you can use older ones), offers the bare minimum for a reliable RAID system. If you're looking to build a newer array, then you'll need three hard drives.

Traditionally, RAID and security have been synonymous — after all, redundancy was one of the main reasons that RAID was created in the first place. This may seem a little strange in these days of super-fast RAID arrays being the norm for high-end systems, but, in essence, RAID is intrinsically as much about protecting your data as much as it is getting several hard drives to act as one large volume. Performance is still important, of course, which is why there are configurations that offer you better access to your drives as well as protecting that data, but to start with it's better to consider the data backup.

When it comes to data security, the pinnacle of redundancy is the basic mirrored array, commonly referred to as RAID 1. As its name suggests, mirroring duplicates data across more than one disk to enable that data to be retrieved should the original (or copy) be unreadable. You need at least two drives in order to create a RAID 1 setup, with more disks providing extra levels of fault tolerance: you'd need a very good reason to warrant data being duplicated across more than one drive though, especially if you're using some form of data backup at the same time.

DUPLICATION METHODS

Configuring a RAID 1 array is as simple as creating a basic striped configuration, and essentially requires that both drives be attached to the same RAID controller and the array defined as a mirrored array in the controller set-up program. The advantage of using a motherboard-integrated solution is that this allows you to boot from this array, although, as RAID 1 setups are most beneficial for protecting data, this may not be as useful as it initially seems. Once set up, you will, of course, only see half the space available of the total amount of storage offered by both drives, but this is the cost of creating a simple mirrored array.

One problem with basic mirrored arrays is that it is an inefficient way of storing data from a price-per-gigabyte perspective. Adding more and more hard drives makes this an even more inefficient solution, which is why there are different levels of RAID that address the data backup problem by using parity as opposed to the straight duplication method. The parity block solution used by RAID works in much the same way as normal parity — data can be recreated by combining the data and the parity blocks from the RAID array if a drive fails.

There are two possible solutions for storing this parity, and each has its own benefits. RAID levels 3 and 4 use a disk specifically for storing this parity information, while RAID 5 spans the parity blocks across the drives. The main disadvantage of having a separate drive for the parity information is that this becomes the bottleneck for every write process, although you can offset this somewhat by using a faster physical hard

DO THIS...

BACK UP YOUR RAID

If you've taken the time to configure your hard drive to protect against drive failure, then it's only reasonable to protect against other damage as well. Indeed, the biggest threat to the data that you are trying to protect isn't from the drives failing, but from the users that have access to that data. Even if you have systems in place to protect that data, there's still a chance it can be corrupted — either due to the applications that access that data or the operating system. What happens if you have a power outage for instance?

The solution is to set up a quality backup regime that creates a hard copy of that data. You can configure scheduled backups of that data using the most basic of programs as well; even the backup utility that comes with Windows is capable of automatically backing up at a set time of each day. The only potential problem here is that your RAID hard drives are going to be too big for burning to DVD-R, in which case, use an external hard drive, another array on your network, or a tape device (but such solutions aren't cheap).

SPOTLIGHT ON...

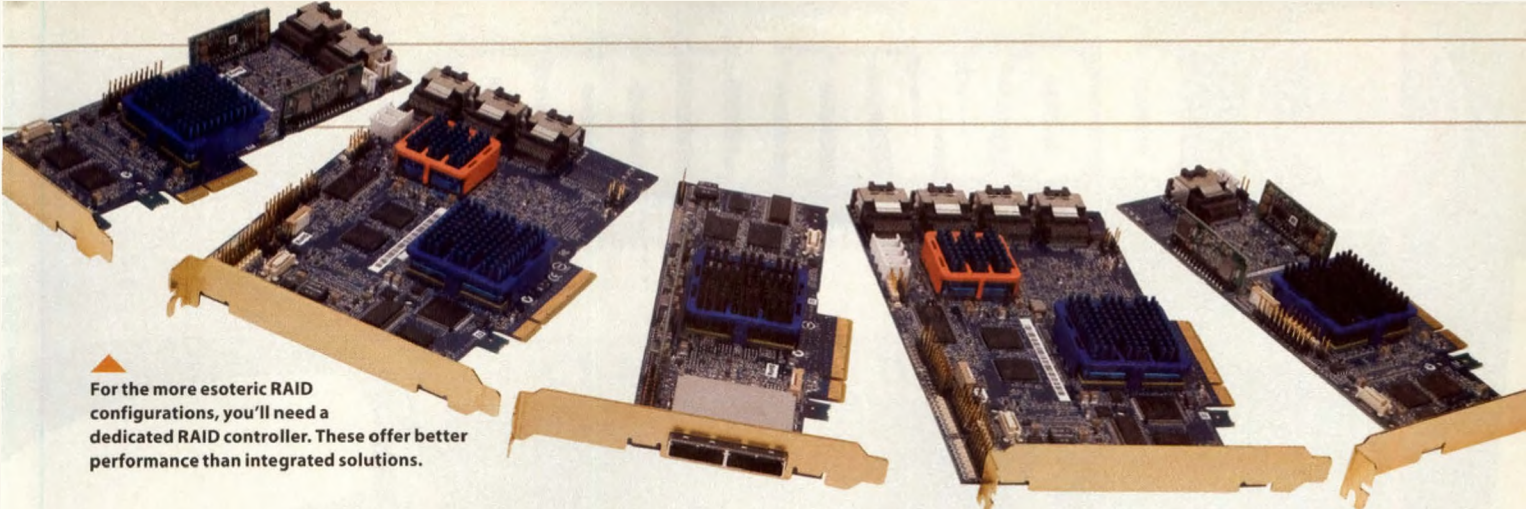
HOT SWAPPING

Hot-swappable drives are less essential in the consumer space than they are on high-end servers, but they do still exist, and with some motherboard chipsets supporting the function, it's worth investigating whether this is a solution for you. Hot swapping enables you to remove a faulty drive and replace it with a working unit without having to turn off the machine first. Such functionality is essential where downtime will cost you money or reputation, but there is a cost when it comes to configuring your system to make the most of this —

basically, you need to put your drives in caddies. The good news is that internal caddies are nowhere near as expensive as you might think. These are installed into a front-mounted 5.25in drive bay, like any optical drive, but they house your actual hard drives as opposed to an optical unit. Should a drive fail, simply pull the drive out and slot a replacement straight into place — push it back in and you're off.

Making RAID arrays hot-swappable is getting cheaper, thanks to the likes of Icy Box.





For the more esoteric RAID configurations, you'll need a dedicated RAID controller. These offer better performance than integrated solutions.

drive for that volume. On the upside, loss of the parity drive has no effect on the overall data integrity of the volume, while on a RAID 5 configuration any drive failure requires it to be replaced for the volume to continue.

DIFFERENT LEVELS

There have been several RAID configurations, or levels as they're commonly known, released over the years that use various forms of redundancy, but until recently they haven't been widely supported by motherboard chipsets. This means that if you like the sound of either RAID 3 or RAID 4 arrays, then you're going to need to buy a discrete RAID controller if you want to build such an array. Luckily you needn't reach for such options when it comes to RAID 5, as Intel and Nvidia have included support for this RAID type in their recent generations of chipsets.

In order to build a RAID 5 array you will need at least three hard drives, although larger configurations are only limited by the number of SATA ports available on your motherboard. The placement of data in a RAID 5 array is defined by the parity block, which rotates through the discs as the data is written. This means that in a three-drive array the parity block will be first written to the final drive in the array, then the second drive and finally the first drive, before rotating back to the final drive.

RAID 5 does result in a performance hit over a straight striped array, but adding more drives results in more overall space. With a three-drive array of 500GB drives, you're looking at a shade under a terabyte of available space. However, for each extra 500GB drive that you add to your array you gain the same amount of storage space, making for a secure and efficient solution if you need to store a lot of data.

There is another way of ordering your disks to protect your data — and that is by using nested arrays. All of the arrays we've talked about so far have employed RAID configurations using individual disks, but some of the more advanced controllers support the building of arrays of the arrays you've defined. So you could, for instance, build a mirror array of your striped disks — or alternatively a striped array of your mirrored disks. This means that you get the benefit of both types of RAID — that is, something which is both secure and high-performing.

It can be pretty confusing to think about, but once you've actually set up such a system, you'll soon forget which way round they go. These arrays use a slightly different nomenclature of

Just to confuse the issue more, you can also have nested arrays of RAID 5 (both RAID 5+0 and RAID 5+1), although the cost of the hard drives needed to set up such a system is prohibitive and the drives are usually better used extending the existing RAID 5 array in the first place.

The important thing about the data protection offered by a RAID setup is that it is there to ward against a drive failure — it doesn't in itself do anything to protect against user or computer errors. Even the tightest configuration will only help you rebuild the array should a drive fail, not if the operating system or data set is compromised. To this end, any system that warrants protecting with redundancy should also use formalised backup to protect that data from other errors.



THE IMPORTANT THING ABOUT A RAID SETUP IS THAT IT IS THERE TO WARD AGAINST A DRIVE FAILURE

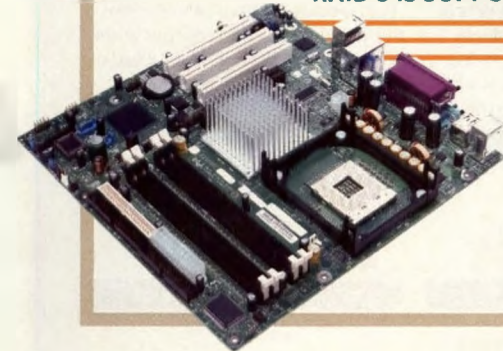
the more basic arrays, and can usually be seen written as RAID 0+1 and RAID 1+0, although the latter is sometimes seen as simply RAID 10. The difference between the two isn't instantly obvious, but essentially if two or more drives fail in the same mirror set in a RAID 1+0 then you'll lose data, while in the case of RAID 0+1 you'll lose data if two drives fail on different sides of the mirror.

PERFORMANCE

Performance is important, and these nested arrays are noticeably faster than straight mirroring, but their added complexity does make RAID 5 a more suitable choice for most.

Those with any experience in protecting data, or trying to recover it after things go wrong, will already know just how important a proper drive configuration is to both hardware faults and user errors. There's nothing quite like reaching for an easily made backup to relieve tensions if the worst happens. Thankfully, because your RAID appears in your operating system as a logical drive, there's nothing to stop you backing it up in the same way you would a normal hard drive. As ever, though, protecting your data is all about good practice and consistency, and the cost of rebuilding lost data. Whatever system you use, do it on a daily basis, and your downtime will be minimal. [EUIE](#)

RAID 5 IS SUPPORTED BY THE LATEST GENERATION OF INTEL AND NVIDIA CHIPSETS





downtime

HIGH PERFORMANCE PLAYTIME

GEAR

GAMES

CHIP ON



Sansa View MP3 player

It's as thin as a pencil. If you believe the marketing photos, Sansa has cracked the MP3 player market, if not actual pencils, with this ultra-thin music/video device. It's not quite nanotechnology, but who wants to fork out thousands for a microscopic storage key for Enrique Iglesias tracks, if it'll just fall through a crack in the shower drain?

CONTACT SanDisk
ONLINE www.sandisk.com.au
PRICE \$299 (BGR)

VERDICT ★★★★★

Golf Master

Boy will this thing put a cramp in the style of amateur golf hacks who like to fudge their scores. It keeps complete track of your shots, and has a full golfing rules ebook. You can save details about different courses — and use it to help choose your clubs. Clip it onto your belt or golf bag and watch the rivalry heat up.

CONTACT Gadget King
ONLINE www.gadgetking.com.au
PRICE \$49.95

VERDICT ★★★★★

Hauppauge XFones

Watch movies on your PC or Mac? Don't mind sticking a pair of headphones on? Then prepare to enter the world of 'Virtual Surround', a new dimension where your boring DVD audio suddenly gets transformed into cinema-like Dolby Digital 5.1 over the airwaves. So, no more punch ups with the neighbours over your subwoofer.

CONTACT New Magic
ONLINE www.newmagic.com.au/
PRICE \$179

VERDICT ★★★★★

BDP-S300 Blu-ray player

Missing even a single frame of *A Night at the Museum* can be a scarring experience, so fortunately Sony has come to the rescue with 'True Cinema (Native Film Motion)' Blu-ray players, which output at the correct 24fps, though you'll need a compatible TV. Perfect excuse to say, "Honey, it's time we put in the order for that HD flatscreen TV."

CONTACT Sony
ONLINE www.sony.com.au
PRICE \$999

VERDICT ★★★★★



AGFAPHOTO AF5080M

Here at Downtime HQ we strive to live the digital lifestyle, for which we need copious amounts of gadgets like this digital photo frame. Your sunset beach strolls will be displayed lovingly for visitors to see on the 800 x 600-pixel resolution LCD, while the soothing sounds of Enya's 'Orinoco Flow' will lift your spirits.

CONTACT Dick Smith
 ONLINE www.dicksmith.com.au
 PRICE \$269

VERDICT ★★★★★

Boss Micro BR Recorder

Dreams of rock stardom are all well and good until you're faced with the complexity of setting up a home recording studio with your PC. Have no fear — you can still go digital without fiddling around with a clunky PC. This little gadget is a four track digital handheld recorder, with effects, drum patterns and inbuilt mic.

CONTACT Roland
 ONLINE www.rolandcorp.com.au
 PRICE \$495

VERDICT ★★★★★

ROCK USB Plasma Ball

Reminiscing about school trips to the science museum will be even easier with this desktop plasma ball. Plug it into a USB port, wave your hand over the sphere and gasp in amazement as 'lightning' follows your fingertips. Inspiration for your desktop, as Anyware says? We think procrastination will never be the same again.

CONTACT Anyware
 ONLINE www.anyware.com.au
 PRICE \$19.50

VERDICT ★★★★★

Sennheiser MX Series

Do your earbuds have a special lacquer finish? These do, and it means they're shiny — and as we all know, the shinier the better. If you're a fan of wearing lanyards then you'll like the MXL 560, which has a loop for attaching your MP3 player or phone. Just do your neck exercises if your MP3 player is pre-2000 vintage.

CONTACT Syntec
 ONLINE www.syntec.com.au
 PRICE From \$14.95

VERDICT ★★★★★



Halo 3

Troy Coleman cosies up to the Arbiter: packs protection.

First released in November 2001, Halo quickly became the first-person shooter. Three years later, Halo 2 smashed global sales records. A further three years later and the records are broken again, with Halo 3 selling more than US\$170 million-worth of copies in its first 24-hours on the shelves.

The story picks up pretty much where Halo 2 left off: Master Chief — with a sidekick, the Arbiter — and the forces of the UNSC are in pursuit of the Covenant as they stream toward Earth to activate the weapons known as the Halos.

Really, not a whole bunch has changed from the previous iterations of the franchise, which is also the reason that the game feels so familiar and playable. During the campaign, there are way too many moments that get, well, let's be honest here, downright boring. Killing the same Grunts and Brutes through the same jungle terrain... oh wait, now we need to kill more Grunts and Brutes, but this time in a bunker. However, just before the gamepad is placed back on the mantle, an absolutely breathtaking scene with something completely different comes to hand, the battle fervour is renewed and all is forgiven. Vehicle levels are definitely in this category. All the classic vehicles are there, plus a couple more, including Brute Chopper: the one wheel, one man, twin-cannon-wielding beast.

Four difficulty levels cater for new players through to Halo vets. A fairly decent play length of around twelve hours should keep the punters happy, and the four-player co-op mode through system link or Xbox Live means that most will at the very least double-dip the campaign. Unlike previous versions, only one player can play the Spartan in Halo 3 — player two plays as the Arbiter, and three and four as two newly created elites.

Rock... another rock, tree... same rock, oh wait, no it's not — up close it just has the same crappy texture as the rest. Never pretending to be on the forefront in

the visuals department, Halo 3 does just enough to get the important through, but the quality is not what we have seen or come to expect from the powerful Xbox 360 platform. Sure, the water is pretty, but it's no BioShock water.

Cut scenes are generally understood to be the shining moments of a title, but, often, especially during dialogue-driven scenes, character modelling seems incredibly crude, and we won't even mention how terrible the lip-syncing is. This is possibly why Master Chief remains a cold faceless body of armour. Instead of allowing punter/character immersion, after three games there's still no real emotional connection to the Chief.

What in all sincerity fortifies the popularity is the incredibly strong multiplayer and online community. Up to four players can play on the same console with split-screen, or up to sixteen over Xbox Live.

Easily the most compelling feature is the Saved Games option. Essentially, it's just like the replays in car games, but with a very impressive free-roaming camera.

It's possible to playback a movie, slow it down and follow a bullet through space and into a target. Movies, which remain the same resolution as the source from which they were recorded, can be saved to the hard drive, shared with other 360s or uploaded to the web. This is sure to send any fanboys into overdrive, so Halo 3 is a must-have for any current fan of the series — and a good time for new-comers.

AVAILABLE PLATFORM	
PC-DVD	Wii
XBOX 360	
CONTACT Microsoft	
ONLINE	www.halo3.com
PRICE	\$99.95
Strong online community.	
Campaign has dull moments.	
VERDICT ★★★★★	



"No, I'm the boss! I'm bigger, my gun is bigger, and it's pink. I win!"



"Hey Pinky, it's time to retreat man, these blue guys are mean. Let's head back to the ship for a cuppa."

UBER

Zelda: Phantom Hourglass

All Peter Dockrill's heart pieces are full for this title.

For one of Nintendo's flagship first-party games, Zelda is certainly making a late appearance on the DS. Luckily, the wait appears to have been well worth it. Phantom Hourglass is that rare release which exudes high quality on almost every level and should prove a must-have title for any DS owner.

Taking up where the somewhat lukewarmly received (for a Zelda game) Wind Waker ended, Phantom Hourglass sees you

reprise the role of Link just months after vanquishing Ganondorf and setting the watery world aright again. However, while sailing the high seas with his pirate pal Tetra (a latter-day Princess Zelda) and her trusty crew, Link is separated from his friends when they encounter a mysterious and abandoned ship at sea. Link regains consciousness washed ashore a sandy beach, and so begins his latest quest to find and rescue the little lady.

Eschewing conventional control-pad play for an almost entirely stylus-directed experience, Phantom Hourglass certainly makes the most of the DS's touchscreen, and this control mechanism, which is quite successful incidentally, constitutes the game's biggest innovation. Elsewhere, you'll find yourself solving the same old Zelda dungeon puzzles, searching the land(s) for items and treasure, and gradually increasing your powers

AVAILABLE PLATFORMS

PC-DVD	Wii	PS 3
PSP	XBOX 360	NINTENDO DS

CONTACT Nintendo
ONLINE www.nintendo.com.au
PRICE \$69.95

✓ Great gameplay, puzzles and design.
 ✗ Only real innovation is control method.

VERDICT ★★★★★

and abilities until you're ready for that final confrontation with evil.

Not that there's anything wrong with that, by the way: due to a fantastic level of attention to detail, the gameplay feels fresh and the characters and story are involving. Add to this lush, cel-shaded graphics à la the Wind Waker (at a DS level) and that familiar, stirring Zelda music (ditto) and you're onto a winner. It's been criticised for being a little easier than some of the previous Zeldas, but it's still one of the best games available on the DS platform and a worthy addition to a famous series.



Enemy Territory: Quake Wars

Lachlan Grant is spawn-camping.

Splash Damage and id Software have been busy in the lab concocting a brand-new addition to the Quake family. Like its predecessor, Wolfenstein: Enemy Territory, the game is an FPS set on huge battlefields, where two opposing teams must slog it out for victory by completing a number of objectives. It's based on the same engine used in Doom 3, along with id Software's own texture-mapping technique called MegaTexture, which does away with the need for repeated terrain tiles.

The story is set somewhere before Quake II, where the Strogg, a destructive evil cybernetic race, have surrounded Earth and are being repelled back by the GDF (Global Defence Force). Up to 12 players on either team can choose from a number of classes: Soldier/Aggressor; Field Ops/Oppressors; Medic/Technician; Covert Ops/Infiltrator; or Engineer/Constructor.

Each round has a series of objectives that need to be

completed within the time limit before the attacking team can claim victory. Each class has a few different weapons to choose from, including assault rifles, sniper rifles, shotguns, nailguns, obliterator and the awesome accursed lacerator. A few classes can build deployables like anti-vehicle or anti-personal turrets to fend off approaching forces, or call on rail howitzers and air strikes to decimate entire areas. Each battlefield includes a range of environments from wide-open landscapes and mountains to maze-like complexes.

The gameplay is very fast paced, and it's easy to lose hours at a time battling away online. Our major gripe with it is the lack of built-in voice chat like what was included in the Battlefield series, but the interface does give you a range of pre-recorded commands, taunts and responses to play with. The game plays a bit more like a massive deathmatch rather than a tactical war.



AVAILABLE PLATFORMS

PC-DVD	Wii	PS 3
PSP	XBOX 360	NINTENDO DS

CONTACT Activision
ONLINE www.enemyterritory.com
PRICE \$89.95

✓ Fast and action-packed.
 ✗ No voice chat.

VERDICT ★★★★★

"Take that! You damned Strogg."



CyberLink



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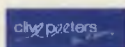
Create quality videos with title, effects & more via automatic Magic editing tools

Pro Moviemaking

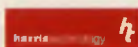
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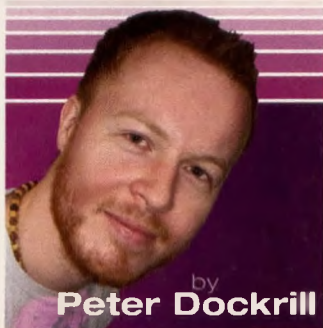
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Mobile Media

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chip chat

by
Peter DockrillTHE SOFTWARE
THAT WASN'T THERE

The *Guardian's* Guy Kewney wrote recently about a software developer, Andy Brice, who devised a software utility called 'AwardMeStars'. Only, it wasn't a software utility: it was just a plain text file masked as an executable. As Kewney put it: "Just to make it clear: It won't work. It doesn't work. It was created as an experiment to see how many shareware awards it could receive." And receive awards it did. AwardMeStars — love that name — won awards from 16 of the sites to which it was uploaded. Brice even received notes of encouragement and recognition from site owners. Why? Because of the free publicity download sites can stand to receive by lavishing praise on virtually every product — real or not — that passes under their radar. Of the 1,033 sites Brice approached, only 421 rejected AwardMeStars. The upshot: next time you're trawling shareware sites for that sought-after app or patch, just bear in mind that not everything you see has been exhaustively tested. (Or tested at all. . .)



LSHMBIB!

Ever get the feeling that you're not expressing yourself as succinctly as you should be? Are you developing a touch of RSI in your wrists from all that excessive typing? Or perhaps you're just a lazy bastard? Well, whatever the reason for your tendency to truncate, the Internet Acronyms Dictionary (www.garde.org/acronyms) is here to help. Ranging from such everyday, garden-variety abbreviations as IMO (In my opinion) and BTW (By the way) all the way through to rather more oblique and esoteric compressions such as XYZ (Examine your zipper) and LMT0 (Laughing my tampon out), now you'll never be short of a shorthand to instruct, beffuddle or amuse your friends and colleagues. Spend a bit of time with the IAD and things get even more bizarre, with seemingly novel-length constructions like DLTDHYWTGLSY (Don't let the door hit ya where the good lord split ya) and IARTPFWTSIOWIM (I am repeating this parrot-fashion without the slightest idea of what it means). WTF?



▲ The IAD: now we can archive our communications as readily as our files!

HONESTY: STILL /
THE BEST POLICY ? /

In a move which commentators are claiming will signal a digital tidal wave for the music industry, English rock band Radiohead has released its next album for free. Literally going for a song (if you want it to), *In Rainbows*, the band's seventh studio album, is being released in two versions: the first is a relatively conventional hard-copy package which contains the CD (plus assorted bonus features) and costs £40; the other format, causing all the fuss, is a digital download in which consumers can individually nominate how much they're willing to part with for the new release (and this, for some or possibly many, could well amount to nothing). Dubbed

the 'honesty box', this sales experiment is being hailed by some observers as a progressive attempt to unearth new and effective alternative retail channels for the recording industry, which is trying desperately to combat illegal downloading and falling CD sales, while simultaneously being criticised by others for hammering the final nails in the regular arrangement's coffin. No doubt, many traditionalist cheapskates may still prefer to opt for the more conventional route of P2P in order to get their fix of 'free' music, but the times are most assuredly a-

Radiohead's Thom Yorke: rock star, activist and now digital music pioneer. . .



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Front View



Rear View



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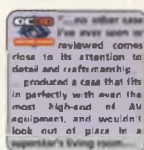
S10V Micro(VFD)

Superior Slim



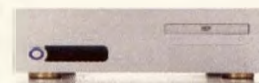
X15e

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X10

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- Performance IC-paired memory and controllers
- Shock and water resistant rubber housing protects your data
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Flash Voyager

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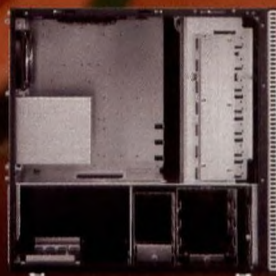


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- Twin PSU mounts
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- 3-speed fan controller
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- 7 x 5.25" and 5 x anti-vibration 3.5" bays
- Measures 215 x 535 x 522mm (W x H x D)

PC-C32B
– Black aluminium



PC-A09B
– Black aluminium



PC-A70B
– Black aluminium



Lian Li PC-C32 Rack-Mountable Desktop Case

This is a one-of-a-kind case offering versatility and style in one package

- Removable handles; choose between desktop or rack-mount positioning
- 2 x 12cm fans, spare 8cm and 14cm fan mounts
- Removable PSU tray
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- HDD and CD-Rom easy-assembly modules
- ATX M/B and standard ATX PSU compatibility
- 2 x 5.25" (5.25" to 3.5" converter x 1) and 4 x 3.5" drive bays
- Measures 426 x 167 x 530mm (W x H x D)

Lian Li PC-A09B Classical Series Mid-Tower Case

Classical styling with a modern flair at an affordable price

- Removable PSU tray
- 2 x 12cm fans (blue LEDs optional)
- Top I/O Ports
- HDD can be turned 180 degrees
- ATX M/B and standard ATX PSU compatibility
- 4 x 5.25" and 3 x 3.25" drive bays
- Measures 210 x 450 x 490mm (W x H x D)

Lian Li PC-A70 Classical Series Full-Tower Case

Versatile full-tower case with classic Lian-Li styling

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PC-C32, PC-A09 and PC-A70 also available in silver aluminium

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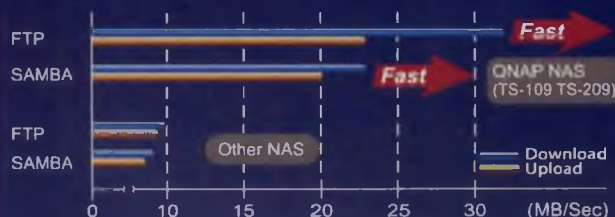
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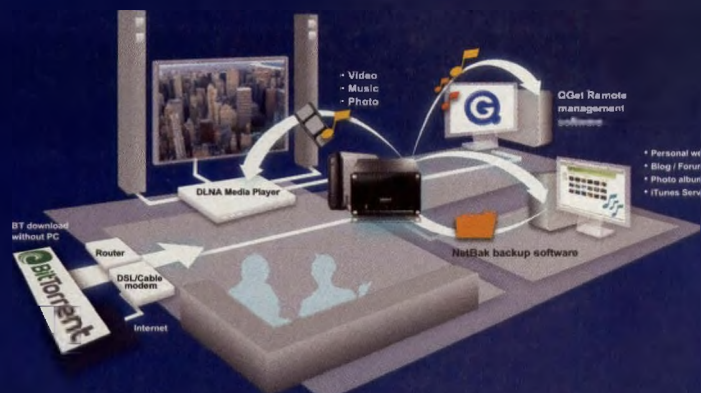
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FTP/SAMBA Testing Environment:
Intel® Core™2 Duo E6600 2.4G/ 1G RAM, Windows Vista Ultimate, ZyXEL Gigabit Switch
FTP/SAMBA Testing Method:
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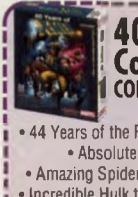
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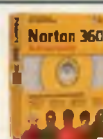
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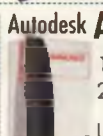
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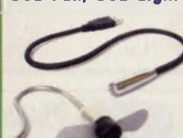
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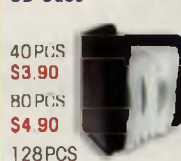
10PK \$2.50

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CD Case



40PCS \$3.90
80PCS \$4.90
128PCS \$8.90

Neck Headphone with Built in Microphone



GB-720WV \$9.00

USB Bluetooth Adaptor



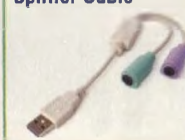
100m \$29.00

4-Port USB Hub



USB 1.1 \$8.50
USB 2.0 with power supply \$18.00

USB to PS/2 Splitter Cable



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Model	TONNY
BCI-24BK	\$5.60
BCI-24C	\$7.20

Model	TONNY
BX-3	\$28.00
BC-02	\$28.00
BC-03	\$28.00
BC-05	\$30.00
BC-20	\$28.00
BCI-3eBK	\$8.80

Model	TONNY
BCI-3eC/M/Y	\$6.40
BCI-6BK	\$6.40
BCI-6C/M/Y	\$6.40
BCI-6G	\$6.40
BCI-6R	\$6.40
BCI-6PC/PM	\$6.40

NEW! Canon Models

Model	Genuine	TONNY
PGI-5BK	\$22.50	\$8.50
CLI-8BK	\$22.50	\$8.50
CLI-8C/M/Y	\$22.50	\$8.50
CLI-8PC	\$22.50	\$8.50
CLI-8PM	\$22.50	\$8.50

Samsung Ink Cartridges

Model	TONNY
M40	\$23.00

Epson Ink Cartridges

Model	TONNY
T001	\$18.90
T003	\$ 9.90
T005	\$18.00
T007	\$ 9.30
T008	\$13.00
T009	\$15.00
T013	\$ 4.50
T014	\$ 7.90
T017	\$ 9.70
T018	\$10.60
T026	\$ 9.70
T027	\$12.40
T028	\$ 9.70
T029	\$10.60
T038	\$ 9.60

Model	TONNY
T039	\$10.60
T0321	\$10.80
T0322	\$ 7.50
T0323	\$ 7.50
T0324	\$ 7.50
T0422C/M/Y	\$ 9.50
T0461	\$ 8.90
T0472/3/4	\$ 8.90
T0491/2/3	\$ 8.90
T0494/5/6	\$ 8.90
T0540/1/2	\$ 8.90
T0541/2/3/4	\$ 8.90
T0547/8/9	\$ 8.90
T0561/2/3/4	\$ 8.90
T5591/2/3	\$ 8.90

HP Ink Cartridges

Model	TONNY
51625A (#25)	\$28.00
51626A (#26)	\$28.00
51629A (#29)	\$28.00
51633MA (#33)	\$32.00
51645A (#45)	\$16.00
51649A (#49)	\$28.00
C1823D (#23)	\$30.00
C4841/2/3/4AA (#10)	\$14.00
C4836/7/8A (#11)	\$14.00
C5010DA (#14)	\$26.00
C5011DA (#14)	\$24.00
C6578D (#78)	\$30.00
C6614A (#20)	\$24.00
C6615DA (#15)	\$24.00

Model	TONNY
C6625A (#17)	\$30.00
C6656AA (#56)	\$18.00
C6657AA (#57)	\$32.00
C6658AA (#58)	\$26.00
C8727A (#27)	\$24.00
C8728AA (#28)	\$26.00
C8765WA (#94)	\$27.00
C8767WA (#96)	\$29.00
C9363WA (#97)	\$32.00
C8721WA (#02)	\$11.00
C8771/2/3WA (#02)	\$10.00
C8774/5WA (#02)	\$10.00
C9351AA (#21)	\$21.00
C9352AA (#22)	\$23.00

Brother Ink Cartridges

Model	TONNY
LC-21BK	\$7.90
LC-21C/M/Y	\$7.50
LC-02BK	\$7.90
LC-02C/M/Y	\$7.50
LC-04BK	\$7.90
LC-04C/M/Y	\$7.50
LC-47BK	\$7.90
LC-47C/M/Y	\$7.50
LC-57BK	\$6.90
LC-57C/M/Y	\$6.50
LC-800BK	\$7.90
LC-800C/M/Y	\$7.50

Lexmark Ink Cartridges

Model	TONNY
12A1970	\$32.00
12A1980	\$35.00
17G0050	\$32.00
17G0060	\$35.00
13400HC	\$36.00
13619HC	\$38.00

Model	TONNY
10N0016 (#16)	\$36.00
10N0026 (#26)	\$39.00
15M0120 (#20)	\$41.00
18C0031 (#31)	\$35.00
18C0034 (#34)	\$35.00
18C0035 (#35)	\$37.00

Brother Toner Cartridges

Model	TONNY
TN-100	\$23.00
TN-200	\$23.00
TN-2025	\$59.00
TN-300	\$23.00

Model	TONNY
TN-3060	\$65.00
TN-8000	\$23.00
TN-6600	\$65.00
TN-7600	\$65.00

Epson Toner Cartridges

Model	TONNY
EPL-5700	\$49.00
EPL-5900	\$49.00
EPL-6200	\$49.00

Lexmark Toner Cartridges

Model	TONNY
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HP Black Toner Cartridges

Model	TONNY
92298A	\$ 65.00
C3906A/F	\$ 49.00
C3903A	\$ 59.00
C3909A	\$ 95.00
C4092A	\$ 49.00
C4096A	\$ 65.00
C4127A	\$ 65.00
C4127X	\$ 80.00
C4129X	\$ 95.00
C4182X	\$135.00
C7115A	\$ 49.00
C7115X	\$ 65.00

TONNY Colour Toner Cartridges

Printer Model	Model	TONNY
HP LJ1500/2500, Canon LBP2410	C9700A (BK)	\$65.00
	C9701/2/3A (CYM)	\$79.00
HP LJ4600	C9720A (BK)	\$155.00
	C9721/2/3A (CYM)	\$185.00
HP LJ4500, Canon LBP2460/2040	C4191A (BK)	\$59.00
	C4192/3/4A (CMY)	\$69.00
HP LJ8000	C4149A (BK)	\$89.00
	C4150/1/2A (CMY)	\$155.00
Epson C900/1900	S050100 (BK)	\$79.00
	S050097/98/99 (CMY)	\$119.00
Epson C1000/C2000	S050033 (BK)	\$90.00
	S050034/5/6(CMY)	\$119.00

Samsung Toner

Model	TONNY
ML-1210D3	\$ 59.00
ML 1650D8	\$105.00
ML-1710D3	\$ 59.00
ML-2010	\$ 59.00
ML-2150D8	\$140.00
ML-4100D3	\$ 83.00
ML-4500D3	\$ 73.00
ML-6060D6	\$ 93.00
SCX-4216D3	\$ 59.00
SCX-5312D6	\$ 79.00
SCX-D4200A	\$ 69.00
SF-5100D3	\$ 59.00

Canon Toner

Model	TONNY
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EP-22	\$49.00
EP-25	\$49.00
EP-26	\$69.00
EP-32	\$65.00
EP-52	\$80.00
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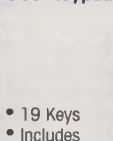
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EPSON CX5900 printer \$159
Canon Pixma iP4300 \$143
Canon Pixma MX300 fax \$166

CPU

Intel Pentium Dual Core E2140 \$94
Intel Pentium Core 2 Dual E6550 \$227
Intel Pentium Core 2 Dual E6750 \$259
AMD Athlon Dual Core 4800 \$134
AMD Athlon Dual Core 6000 \$215

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Logitech X-530 5.1 \$79
Superb 5.1-channel sound system, 70 watts output

Logitech X-240 2.1 speakers \$65
Creative SBS-370 2.1 speakers \$40
Studio Acoustics stereo Indoor/Outdoor speakers \$65

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Netgear DG834G Wireless Modem Router \$119
TP-Link 108M Wireless PCMCIA \$29
Linksys WAG200G Wireless Modem Router \$115
Netgear 54M Wireless Router WGR614 \$69
D-Link ADSL 2/2+ Modem DSL-G604T \$115

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A8SC-4P007E

- 14" wide WXGA LCD
- Core 2 Duo T7300
- 1G RAM, 120G HDD
- DVD RW Dual Layer
- nVidia Geforce 8400M
- Vista Business

\$1321

F3E-AP053E

- 15.4" wide WXGA LCD
- Core 2 Duo T7100 1.8G
- 1G RAM, 120G HDD
- DVD RW Dual Layer
- Intel X3100 graphics
- Vista Business

\$1239

F3SC-AS127E-TM

- 15.4" wide WXGA LCD
- Core 2 Duo T7300 2.0G
- 2G RAM, 160G HDD
- DVD RW Dual Layer
- nVidia Geforce 8400M
- Vista Business

\$1594

F3SV-AK136G

- 15.4" wide WSXGA LCD
- Core 2 Duo T7500 2.0G
- 2G RAM, 200G HDD
- DVD RW Dual Layer
- Geforce 8600 256m
- Vista Ultimate

\$1978

V2S - 4S031G

- 14" wide WXGA LCD
- Core 2 Duo T7500 2G
- 2G RAM, 160G HDD
- DVD RW Dual Layer
- Geforce 8600 256m
- Vista Ultimate

\$2599

W6Fp - Leather

- 13.3" wide WXGA LCD
- Core 2 Duo T5600 1.8G
- 1G RAM, 100G HDD
- DVD RW Dual Layer
- Intel® 945GM Graphic
- Vista Home Premium

\$1689

HP F555AU AMD 2G / 15.4" WXGA LCD / 512M RAM / 80G HDD / Combo / Wireless Lan / Windows Vista Home Basic

\$749

HP Business Notebook 530 GY170AA Core Duo T2300E 1.66G/15.4" wide LCD / 1G RAM / 120G HDD / DVD RW Dual Layer / Windows Vista Business

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Desktop

From \$1016



i-Office

- Slim case can be tower or desktop
- Intel Duo Core processor E4400
- 512M Memory, 160G SATA HDD
- 16x DVDROM
- 17" LCD
- Keyboard & Optical Mouse
- XP Professional

From \$1754



a-Gamer

- AMD Athlon 64x2 processor
- 1GB Memory, 250G SATA HDD
- 320M nVidia GF 8800GTS graphic
- DVD +/- Dual Layer Burner
- 19" LCD, Logitech X530 speakers
- Gaming Keyboard & Laser Mouse
- XP Professional

From \$1449



I-775X

- Intel P35 chipset motherboard
- Intel® Core™ 2 Duo CPU E4400
- nVidia® nForce 8600Gt Graphic
- 250GB SATA 2 Hard Disk
- 2G Memory, DVD RW +/- Dual Layer
- 19" LCD, Keyboard, Mouse, Speakers
- Vista Home Premium

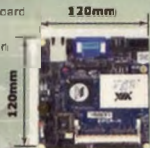
Software oem

Windows XP Home \$120
Windows XP Professional \$189
Windows XP MediaCenter \$170
Windows Vista Home Basic \$130
Windows Vista Home Premium \$149
Windows Vista Business \$189
Windows Vista Ultimate \$275
Office 2007 Home & Student \$210
Office 2007 Pro Academic \$249
Office 2007 Basic \$215
Office 2007 Small Business \$299
Office 2007 Professional \$389
MS works suite 2006 \$95
Kaspersky Internet Security 7.0 \$40
Kaspersky Antivirus 7.0 \$30
Adobe photoshop / Premiere Ad \$154

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World's Smallest Mobo

- All in One
- VIA Luke CoreFusion™ Processor onboard with integrated UniChrome™ Pro AGP graphics w/MPEG2/MPEG4 Acceleration
- DDR 266/333/400 (SODIMM)
- 1 Mini-PCI slot
- VIA Vinyl 6 Channel Audio
- 6 USB 2.0 ports
- VIA 10/100 LAN
- VIA TV Out (HDTV)
- LVDS/DVI (optional)
- Nano-ITX (120mm x 120mm)
- Digital Media and Mobile Entertainment



Model: EPIA-N



- All in One
- VIA C7™/Eden™ Processor onboard with integrated UniChrome™ Pro AGP graphics w/MPEG-2 acceleration
- DDRII 400/533
- 1 PCI slot
- Vinyl 6 channel Audio
- IEEE 1394 Firewire
- 6 USB 2.0 ports
- 2 COM ports
- GLAN Controller
- TV Out (HDTV)
- LVDS/DVI (optional)
- Mini-ITX (170mm x 170mm)
- Digital Media, Entertainment, Set Top Box

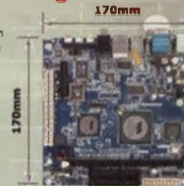


Model: EPIA-EN



Powerful and Flexible Digital Media

- All in One
- VIA C7™ Processor onboard with integrated UniChrome™ Pro AGP graphics w/MPEG-2 acceleration
- DDRII 400/533
- 1 PCI slot
- Vinyl 6 channel Audio
- 8 USB 2.0 ports
- 1 COM port
- 10/100 LAN
- TV Out
- Mini-ITX (170mm x 170mm)
- KIOSK, Thin Client



Model: EPIA-CN



- All in One
- VIA C3™/Eden™ Processor onboard with integrated UniChrome AGP graphics w/MPEG-2 Acceleration
- DDR 266
- CardBus/CompactFlash Support
- 1 PCI slot, 1 Floppy Connector
- Vinyl 6 channel Audio
- IEEE 1394 Firewire
- 4 USB 2.0 ports
- 2 COM ports
- VIA 10/100 LAN
- TV Out
- LVDS/DVI (optional)
- Mini-ITX (170mm x 170mm)
- Wireless Media Kiosk Set Top Box



Model: EPIA-MII



Hard Working Small&Quiet Systems

- All in One
- VIA Luke CoreFusion Processor with integrated UniChrome Pro AGP Graphics with MPEG-2/MPEG-4 Acceleration
- DDR 400 DIMM
- 1 PCI slot
- 2 SATA ports
- VIA Vinyl 6 Channel Audio
- 8 USB 2.0
- 4 COM ports
- 2 VIA 10/100 Ethernet (1 optical Gigabit)
- 1 Digital I/O 4GPI/4GPO
- LVDS/DVI (optional)
- Mini-ITX Form Factor (170mm x 170mm)
- Always-on Point of Sales Applications



Model: EPIA-EK



Digital Media and Entertainment

- All in One
- VIA C3™/Eden™ with Processor onboard integrated UniChrome AGP graphics w/MPEG-2 Acceleration
- DDR 266
- 1 PCI slot, 1 Floppy Connector
- Vinyl 6 channel Audio
- IEEE 1394 Firewire
- 4 USB 2.0 ports
- VIA 10/100 LAN
- TV Out
- LVDS/DVI (optional)
- Mini-ITX (170mm x 170mm)
- Digital Media and Entertainment



Model: EPIA-M



19" Mini-ITX Rackmount

Model No.: 7677

- 19" 1U Rackmount
- Internal 3.5" HDD x 1
- PCI Expansion Slot x 2
- Slim Type CD / DVD x 1
- 45(H) x 484(W) x 400(D)
- Cooling: 2 x 40mm fans
- Power and HDD indicators
- Mini-ITX (170mm x 170mm)
- Power on/off



19 inch

Firewall/VPN/Telephony/Telecom/VoIP Network/Security/Military Application

Model No.: C1B

- 19" 1U Rackmount
- Internal 3.5" HDD x 1
- Internal 2.5" HDD x 1
- PCI Expansion Slot x 1
- Slim CD-rom/DVD-rom x 1
- 19"(W) x 13"(D) x 1.75"(H)
- Mini-ITX (170mm x 170mm)
- Cooling: 2 x 40x28mm fans
- Power on/off and system reset
- Power, LAN and HDD indicators



Firewall/VPN/Telephony/Telecom/VoIP Network/Security/Military Application

Model No.: C1E

- 19" 1U Rackmount
- Internal 3.5" HDD x 2
- PCI Expansion Slot x 1
- Slim CD-rom/DVD-rom x 1
- 19"(W) x 14.5"(D) x 1.75"(H)
- Front access USB & LAN ports
- Power LAN and HDD indicators
- Up to 12" x 9.6" ATX size mobo
- Power on/off and system reset
- Cooling: 1 x 57mm blower or 2 x 40x56mm fans



World's Smallest Case

Model No.: 1677

- Color: Black
- Front Port: USB x 2
- Internal 2.5" HDD x 1
- Slim Type CD / DVD x 1
- 60W/80W Power Adaptor
- Nano-ITX (120mm x 120mm)
- Power on/off and system reset
- 82.5mm(H) x 160mm(W) x 163mm(D)



Home Media Center, Set Top Box, Kiosk, Wireless Media

Model No.: 2677

- Color: Black
- Expansion Slot x 1
- Internal 3.5" HDD x 1
- 4cm Cooling Fan x 2
- Slim Type CD / DVD x 1
- 60W/80W Power Adaptor
- Mini ITX (170mm x 170mm)
- Power on/off and system reset
- 63.5mm(H) x 285mm(W) x 272mm(D)



Home Media Center, Set Top Box, Kiosk, Wireless Media

Model No.: 2600

- Color: Black
- Expansion Slot x 1
- Internal 3.5" HDD x 1
- 4cm Cooling Fan x 2
- Slim Type CD / DVD x 1
- 63.5(H) x 295(W) x 272(D)
- Mini ITX (170mm x 170mm)
- 60W/80W Power Adaptor
- Power on/off and System Reset
- USB x 2, Audio x 1, Mic x 1, 1394 x 1, IR Module (Optional)



Set Top Box, Thin Client, Car Entertainment, Smart Mini PC

Model No.: 3677

- Front Port: USB x 2
- Internal 2.5" HDD x 1
- 6cm Cooling Fan x 1
- Slim Type CD / DVD x 1
- 60W/80W Power Adaptor
- Mini ITX (170mm x 170mm)
- Power on/off and system reset
- 85mm(H) x 210mm(W) x 275mm(D)



Set Top Box, Thin Client, Car Entertainment, Smart Mini PC

Model No.: 3688

- Front Port: USB x 2
- Internal 2.5" HDD x 1
- 6cm Cooling Fan x 1
- Slim Type CD / DVD x 1
- 60W/80W Power Adaptor
- Mini ITX (170mm x 170mm)
- Power on/off and system reset
- 65mm(H) x 210mm(W) x 258mm(D)



Stylish Cube Entertainment centers

Model No.: 669

- Expansion Slot x 2
- Internal 3.5" HDD x 1
- 4cm Cooling Fan x 2
- External 3.5" HDD x 1
- External 5.25" HDD x 2
- 200W ATX Power Supply
- Mini-ITX (170mm x 170mm)
- USB 2.0 x 2, 1394/Audio/Mic x 1
- 260mm(H) x 225mm(W) x 330mm(D)



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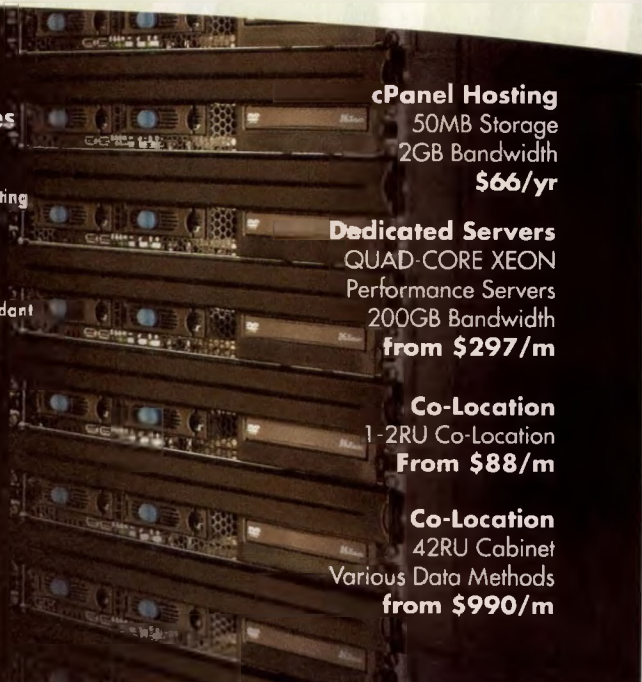
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- Dell Rackmount Servers
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Roy Morgan Survey June 07

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Get MOBILE

harristechnology



November 2007

POWER CHOICE FOR BUSINESS

EXCLUSIVE



6710b

\$1799

V1266 | RENT \$20.17/wk* | p. 7



● **BONUS** 1GB RAM, BAG, MOUSE & HUB

BONUS

TAKE IT WITH YOU

BUFFALO

300GB MiniStation
TurboUSB Portable
Hard Drive

NEW

\$399

V2141 | p. 31



ONLY
@ HT

acer

Veriton VT7900
Quad Core PC

\$1299

RENT \$15.03/wk*

S9579 | p. 13



QUAD
CORE

ONLY
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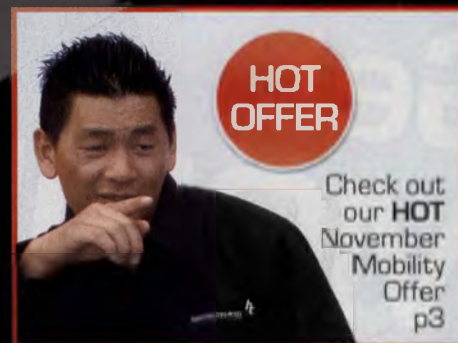


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John Lo - North Ryde Call Centre

Work OUTside and Stay IN touch

We have the products and support to get you mobile with confidence. Connect as many products as you need, when you need them. You can also choose to RentSmart your mobile notebook for just over \$20 a week. That's a smart choice to get you working outside but staying in touch.

Contents

- 04 | Notebooks
- 12 | Desktops
- 14 | Monitors
- 16 | Projectors
- 18 | PDAs, GPS & Smartphones
- 20 | Mobile Phones
- 22 | Internet, VoIP & Cordless
- 24 | Cameras
- 25 | Networking & Servers
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- 34 | Media & Optical Drives
- 36 | Accessories
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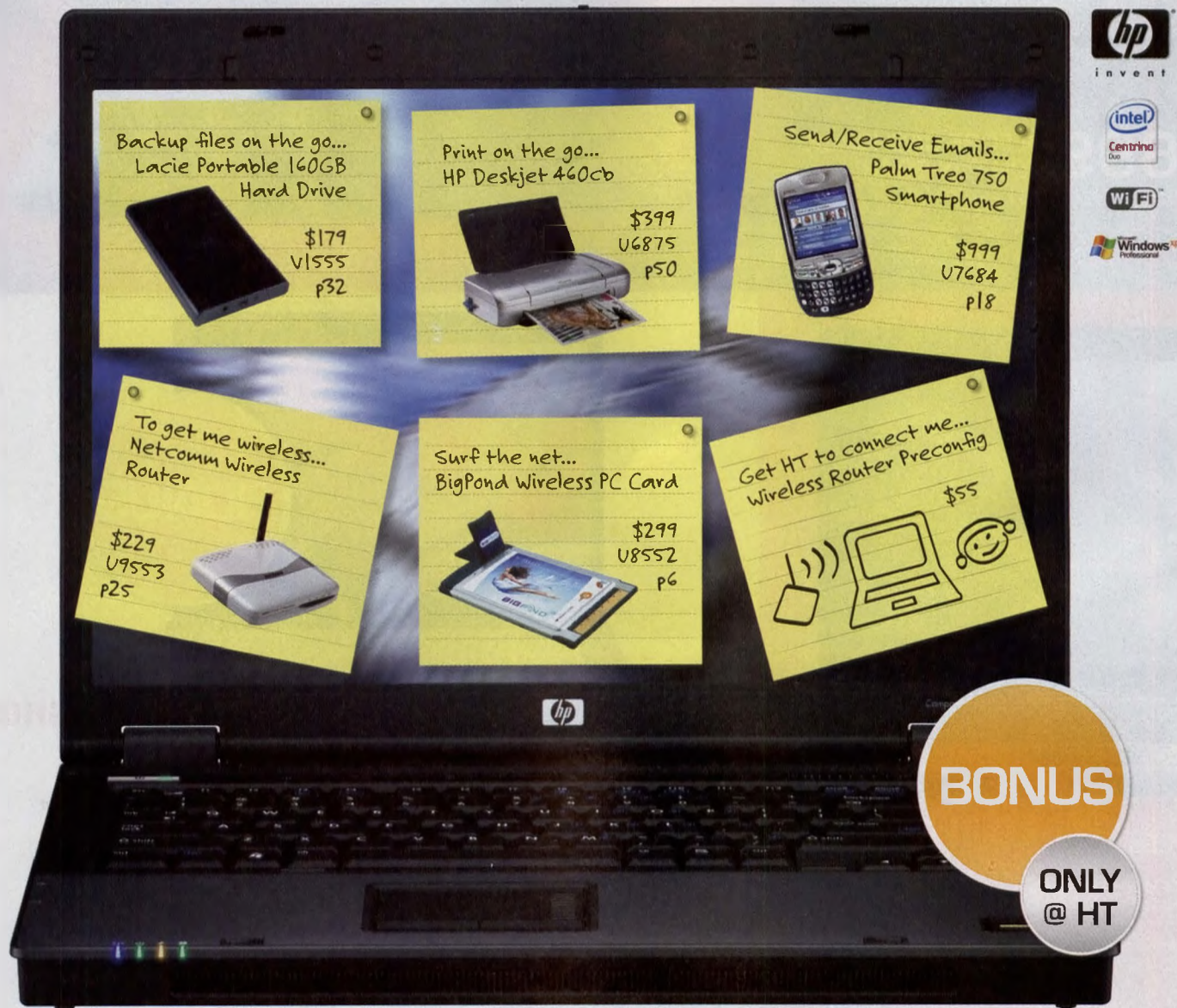
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BUY A HP 6710b NOTEBOOK WITH ANY 2 OF THESE MOBILE ACCESSORIES AND **SAVE 10% OFF BUNDLE PRICE¹**



The image shows an HP 6710b Notebook with its screen displaying six yellow sticky notes, each representing a mobile accessory. The accessories are:

- Backup files on the go... Lacie Portable 160GB Hard Drive**
\$179 V1555 P32
- Print on the go... HP Deskjet 460cb**
\$399 V6875 P50
- Send/Receive Emails... Palm Treo 750 Smartphone**
\$999 V7684 P18
- To get me wireless... Netcomm Wireless Router**
\$229 V9553 P25
- Surf the net... BigPond Wireless PC Card**
\$299 V8552 P6
- Get HT to connect me... Wireless Router Preconfig**
\$55

On the right side of the notebook, there are logos for HP invent, Intel Centrino Duo, Wi-Fi, and Windows XP Professional. A large orange circle with the word **BONUS** is overlaid on the bottom right of the notebook. Below it, a smaller white circle contains the text **ONLY @ HT**.

Light & Portable HP 6710b Notebook for **\$1799** | V1266 | RENT \$20.17/wk*
Comes with **BONUS** 1GB RAM, Carry Bag, Mouse & Hub!

¹Bundle price is only available on the products listed on this page.

Extensa 5220

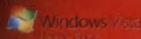
Best value first notebook

- Intel Celeron M 530 1.7GHz
- 512MB DDR2 RAM
- 80GB* Hard Drive
- DVD SuperMulti Dual Layer Drive
- **15.4" WXGA Widescreen**
- Wireless LAN 802.11b/g
- Windows Vista Home Basic
- 1 year warranty

acer



Wi-Fi



\$149 CASHBACK*

BONUS

\$699 BEFORE CASHBACK
YOU PAY \$848

V1620 | RENT \$9.81/wk*

● **BONUS** NOTEBOOK CARRY BAG INCLUDED

Image for illustration purposes only



6720s

Entry Level Backed by
Hewlett Packard Support

- Intel Celeron M 540 1.8GHz
- 1GB DDR2 RAM
- 80GB* Hard Drive
- DVD SuperMulti ±Dual Layer
- **15.4" WXGA Widescreen**
- Wireless LAN 802.11a/b/g
- Weighs 2.5kg
- Windows Vista Business
- 1 year warranty



Wi-Fi



\$899 | V0850

RENT \$10.40/wk*



BONUS

TOSHIBA

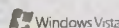
Satellite Pro A200

Stylish Value with Toshiba
Technology and Design

- Intel Celeron M 520 1.6GHz
- 512MB DDR2 RAM
- 80GB* Hard Drive
- DVD SuperMulti ±Dual Layer Drive
- **15.4" WXGA Widescreen**
- Wireless LAN 802.11a/b/g
- Weighs 2.7kg
- Windows Vista Home Basic
- 1 year warranty



Wi-Fi



\$899 | V1033

RENT \$10.40/wk*

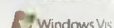
Satellite Pro A200

Ready to serve the business needs of
small and medium sized companies

- Intel Core 2 Duo T7100 1.8GHz
- 2 x 512MB DDR2 RAM
- 160GB* Hard Drive
- DVD SuperMulti ±Dual Layer Drive
- ATI Mobility Radeon HD240 Graphics
- **15.4" WXGA Widescreen**
- Wireless LAN 802.11a/b/g
- Weighs 2.9kg
- Windows Vista Business
- 1 year warranty



Wi-Fi



\$1539 | V1036

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● **BONUS** BAG, 25 PACK DVD MEDIA & 4 PORT HUB

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6710s

Day to day business runner with everything you need to stay mobile and connected

- Intel Core 2 Duo T7300 2GHz
- 1GB DDR2 RAM
- 120GB* Hard Drive
- DVD SuperMulti ±Dual Layer
- **15.4" WXGA Widescreen**
- Intel GMA X3100 Graphics
- Wireless LAN 802.11a/b/g
- Up to 4.25 hours of battery life
- Weighs 2.6kg
- Windows XP Professional
- 1 year warranty

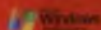
\$1499

V2226 | RENT \$16.81/wk*

BONUS 1GB RAM² & BAG



invent



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BONUS

6515b

Cost effective highly portable business or study tool

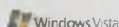
- AMD Turion MK-38 2.2GHz
- 1GB DDR2 RAM
- 80GB* Hard Drive
- DVD SuperMulti ±Dual Layer
- **14.1" WXGA Widescreen**
- Wireless LAN 802.11a/b/g
- Weighs 2.4kg
- Windows Vista Business
- 1 year warranty

\$999

U8202
RENT \$11.56/wk*



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BONUS

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BONUS HP PRINTER

6715b

High resolution screen, perfect for displaying complex excel & word documents

- AMD Turion 64 X2 TL-64 2.2GHz
- 2 x 1GB DDR2 RAM
- 160GB* Hard Drive
- DVD SuperMulti ±Dual Layer Drive
- **15.4" WSXGA+ Widescreen**
- ATI Radeon Xpress 1250 with up to 512MB Shared
- Wireless LAN 802.11a/b/g/n
- Bluetooth v2.0
- Weighs 2.7kg
- Up to 3.75 hours battery life
- 1 year warranty

\$1699

RENT \$19.05/wk*
U6011 | VISTA BUSINESS
U5684 | XP PROFESSIONAL

BONUS BATTERY

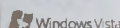


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Satellite Pro S200

TOSHIBA

Fantastic performance with Toshiba engineering

- Intel Core 2 Duo T7500 2.2GHz
- 2 x 1GB DDR2 RAM
- 160GB* Hard Drive
- DVD SuperMulti ±Dual Layer Drive
- **15.4" WXGA Widescreen**
- Wireless LAN 802.11a/b/g
- Weighs 2.9kg
- Windows XP Professional
- 1 year warranty

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U5917
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\$100^**



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EasyGuard**

TOSHIBA

	Intel Core 2 Duo T7100	Intel Core 2 Duo T7300	Intel Core 2 Duo T7300
Processor	Intel Core 2 Duo T7100	Intel Core 2 Duo T7300	Intel Core 2 Duo T7300
Clock Speed	1.8GHz	2GHz	2GHz
RAM	1GB DDR2	1GB DDR2	1GB DDR2
Hard Drive*	80GB*	80GB*	120GB*
Optical Drive	DVD SuperMulti ±Dual Layer	DVD SuperMulti ±Dual Layer	DVD SuperMulti ±Dual Layer
Screen	15.4" WXGA Wide	15.4" WXGA Wide	15.4" WXGA Wide
Wireless LAN	802.11a/g/n	802.11a/g/n	802.11a/g/n + Bluetooth v2.0
Weight	2.9kg	2.9kg	2.9kg
Operating System	Windows XP Professional	Windows Vista Business	Windows Vista Business
Warranty	1 year	1 year	1 year
Bundled with	BigPond Wireless PC Card or BigPond Wireless USB	BigPond Wireless PC Card or BigPond Wireless USB Windows XP Professional Conversion Disc	BigPond Wireless PC Card or BigPond Wireless USB Windows XP Professional Conversion Disc
Bundle Price	\$1679 U9698	\$1848 U9699	\$1958 U9701
RENT/wk*	\$18.83	\$20.72	\$21.95

Belkin Desktop Mobility Bundle

Keep your notebook protected while travelling with the koskin leather case. When working at a desk, secure your notebook with the easy to use lock and enjoy the added convenience of a separate keyboard and mouse.

\$149 | U9599



BELKIN

Belkin Mobility Bundle

This great Belkin Mobility Bundle is EXCLUSIVE to Harris Technology. Designed for your mobile needs, it represents excellent value for money.

\$99 | U9353



BELKIN

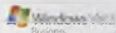
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ThinkPad R61

The best engineered ThinkPad R61 is for those looking for the best everyday notebook, with a large and high resolution display, and a thinner, stronger and lighter chassis.

- Intel Core 2 Duo T7500 2.2GHz
- 2 x 1GB DDR2 RAM (inc Bonus 1GB)
- 160GB* Hard Drive
- DVD SuperMulti Dual Layer Drive
- **15.4" WSXGA+ Widescreen**
- Intel GMA X3100 Graphics
- Wireless LAN 802.11a/g/n
- Bluetooth v2.0
- Integrated Web cam
- Up to 5 Hours of battery life
- Weighs 2.9kg
- Windows Vista Business
- 1 year warranty

lenovo



BONUS

NEW

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\$1799 | RENT \$20.17/wk*

Windows Vista Business | V2258

Windows XP Professional | V2259

BONUS 1GB RAM, PREMIERE LEATHER CASE & 4GB USB KEY*

Great Options: 50% off Normal Prices!

Advanced Mini Dock with AC Adaptor - One touch connection to your desktop peripherals | **\$149** | T3723

Lenovo 2 Year Extended Warranty - Protect your investment for peace of mind | **\$174** | 49894



BONUS

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6710b

Power choice for business

- Intel Core 2 Duo T7500 2.2GHz
- 2 x 1GB DDR2 RAM (inc bonus 1GB)
- 120GB* Hard Drive
- DVD SuperMulti ±Dual Layer Drive
- **15.4" WXGA Widescreen**
- Intel GMA X3100 Graphics
- Wireless LAN 802.11a/g/n
- Bluetooth v2.0
- Weighs 2.6kg
- Up to 4.25 hours of battery life
- 1 year warranty



\$1799 | RENT \$20.17/wk*

Windows Vista Business | V1263

Windows XP Professional | V1266



BONUS 1GB RAM*, BAG, MOUSE & HUB

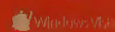


TOSHIBA

Satellite Pro M200

Compact, portable and stylish

- Intel Core 2 Duo T5450 1.6GHz
- 1GB DDR2 RAM
- 80GB* Hard Drive
- DVD SuperMulti ±Dual Layer
- **14.1" WXGA Widescreen**
- Intel X3100 Graphics
- Wireless LAN 802.11a/b/g
- Weighs 2.3kg
- Windows Vista Business
- 1 year warranty



\$1649 | U9702 | RENT \$18.49/wk*

3 Year Harris Technology Extended Warranty Plan

Protect your investment for peace of mind!

Up to \$2000 notebook | **\$239** | S0601

Up to \$4000 notebook | **\$289** | S0602

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Want to speed things up?

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Amicroe 1GB DDR2-667 RAM for Notebooks

\$109 | U6922

Amicroe 2GB DDR2-667 RAM for Notebooks

\$299 | U7787

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3. Tax deductible
4. Always have the latest equipment
5. Get more equipment
6. Fast approval

RENTSMART
Because buying isn't

6710b Bundle

Great for the knowledgeable business user looking for something with more power

- Intel Core 2 Duo T7700 2.4GHz
- 2 x 1GB DDR2 RAM
- 160GB* Hard Drive
- DVD SuperMulti ±Dual Layer Drive
- **15.4" WSXGA+ Widescreen**
- Intel GMA X3100 Graphics
- Wireless LAN 802.11a/g/n
- Bluetooth v2.0
- Up to 5.25 hours of battery life
- Weighs 2.6kg
- Windows Vista Business
- 1 year warranty
- Bundled with Carry bag, 4 port hub, mouse and 7 in 1 retractable cable kit



\$2179 | RENT \$24.43/wk*

U9079 | WINDOWS XP PROFESSIONAL

U9049 | WINDOWS VISTA BUSINESS

Flagship Model



8510p

- Intel Core 2 Duo T7500 2.2GHz
- 1GB DDR2 RAM
- 160GB* Hard Drive
- DVD SuperMulti ±Dual Layer Drive
- **15.4" WSXGA+ Widescreen**
- ATI Mobility Radeon HD 2600 w 512MB HyperMemory
- Wireless LAN 802.11a/b/g
- Bluetooth v2.0
- Windows Vista Business
- 1 year warranty
- Includes Windows XP Professional recovery discs

2.8 kg



\$2399 | V2304

RENT \$26.01/wk*

Stylish & Powerful



VAIO FZ25GN

- Intel Core 2 Duo T7250 2GHz
- 1GB DDR2 RAM
- 160GB* Hard Drive
- DVD SuperMulti ±Dual Layer Drive
- **15.4" WXGA Widescreen**
- nVidia GeForce Go 8400 with up to 383MB TurboCache
- Wireless LAN 802.11a/b/g
- Bluetooth v2.0
- Windows Vista Business
- 1 year warranty

2.7 kg

SONY



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\$2099 | V2705

RENT \$23.54/wk*

● **BONUS 1GB RAM***

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TravelMate 5720G

- Intel Core 2 Duo T7300 2GHz
- 1GB DDR2 RAM
- 160GB* Hard Drive
- DVD SuperMulti Dual Layer Drive
- **15.4" WXGA Widescreen**
- ATI Radeon X2500 with up to 512MB HyperMemory
- Integrated Acer CrystalEye webcam
- Wireless LAN 802.11a/g/n
- Bluetooth v2.0
- Up to 3 hours of battery life
- Weighs 3kg
- Windows Vista Business
- 1 year warranty

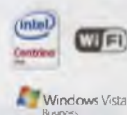
LIMITED STOCK

\$1699

U7902 | RENT \$19.05/wk*



acer



BONUS 1GB RAM² & CARRY BAG

Ultimate Business Reliability



ThinkPad T61

lenovo

- Intel Core 2 Duo T7500 2.2GHz
- 1GB DDR2 RAM
- 120GB* Hard Drive
- DVD SuperMulti ±Dual Layer Drive
- **15.4" WXGA Widescreen**
- nVidia Quadro 140M with 128MB RAM
- Wireless LAN 802.11a/b/g
- Bluetooth v2.0
- Windows Vista Business
- 3 year warranty



50% OFF DOCK AND WARRANTY. See page 7



Ideal Desktop Replacement



TravelMate 7720G

acer

- Intel Core 2 Duo T7500 2.2GHz
- 2 x 1GB DDR2 RAM
- 2 x 160GB* Hard Drive
- DVD SuperMulti Dual Layer Drive
- **17" WXGA Widescreen**
- ATI Radeon HD 2600 XT 1GB HyperMemory
- Wireless LAN 802.11a/g/n
- Bluetooth v2.0
- Integrated 1.3 megapixel Orbicam
- Windows XP Professional



Stunning Large 17" Display



Satellite Pro P200 TOSHIBA

- Intel Core 2 Duo T7300 2GHz
- 1GB DDR2 RAM
- 200GB* Hard Drive
- DVD SuperMulti ±Dual Layer Drive
- ATI Mobility Radeon HD 2600 with 256MB RAM
- **17" WSXGA+ Widescreen**
- Wireless LAN 802.11a/g/n
- Bluetooth v2.0
- Windows Vista Business
- 1 year warranty



\$2999 | V1588
RENT \$31.90/wk*

BONUS PREMIERE LEATHER CASE & 4GB USB KEY³

\$2499 | V1061
RENT \$27.10/wk*

BONUS CARRY BAG

\$2639 | V0660
RENT \$28.62/wk*

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Ultra Light Notebook Range



Greater Wireless Range

Acer Signal Up technology makes sure you're better connected than the rest.



EasyGuard Protection Technologies

Toshiba form and function with EasyGuard security, connection and protection features to keep things running seamlessly.



Data Protection Built In

The ultimate business notebook with ThinkPad hardware protection and ThinkVantage Rescue and Recovery software.



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TravelMate 6292

acer

- Intel Core 2 Duo T7500 2.2GHz
- 2 x 1GB DDR2 RAM
- 160GB* Hard Drive
- DVD SuperMulti Dual Layer Drive
- 12.1" WXGA Widescreen
- Intel GMA X3100 Graphics
- Integrated Acer CrystalEye Webcam
- Wireless LAN 802.11a/g/n
- Bluetooth v2.0
- Windows XP Professional
- 3 year warranty



\$2299 | V2693
RENT \$24.93/wk*

● **BONUS** CARRY BAG



Portege M600

TOSHIBA

- Intel Core 2 Duo T7100 1.8GHz
- 1GB DDR2 RAM
- 120GB* Hard Drive
- DVD SuperMulti ±Dual Layer Drive
- 13.3" WXGA CSV LED Widescreen
- Wireless LAN 802.11a/g/n
- Bluetooth v2.0
- Windows Vista Business
- 3 year warranty



\$2299 | V0654
RENT \$24.93/wk*



NEW

BONUS

ThinkPad X61

lenovo

- Intel Core 2 Duo T7250 2GHz
- 1GB DDR2 RAM
- 120GB* Hard Drive
- 12.1" WXGA Widescreen
- Wireless LAN 802.11a/g/n
- Bluetooth v2.0
- Windows Vista Business
- 3 year warranty



\$2999 | V1624
RENT \$31.90/wk*

● **BONUS** PREMIERE LEATHER CASE & 4GB USB KEY¹

Portege R400 Tablet

The Flagship Tablet

- Intel Core Duo U2500 1.2GHz ULV
- 2 x 1GB DDR2 RAM
- 80GB* Hard Drive
- 12.1" WXGA LED CSV Widescreen
- Wireless LAN 802.11a/b/g
- Bluetooth v2.0
- Weighs 1.7kg
- Windows Vista Business
- 3 year warranty

TOSHIBA



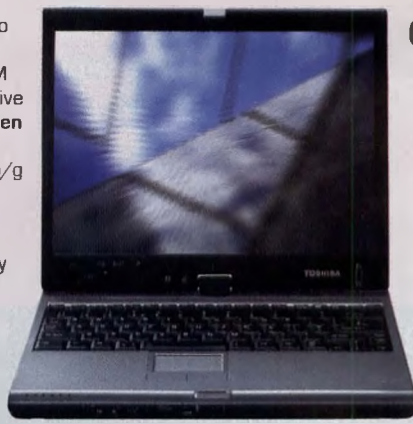
\$3849
U4642 | RENT \$40.19/wk*

Portege M400 Tablet

A convertible tablet for the discerning mobile user

- Intel Core 2 Duo T5500 1.6GHz
- 1GB DDR2 RAM
- 80GB* Hard Drive
- 12.1" XGA Screen
- Wireless LAN 802.11a/b/g
- Weighs 2kg
- Windows XP Tablet Edition
- 3 year warranty

TOSHIBA



\$2969
V1038 | RENT \$31.58/wk*

*For terms and conditions, including RentSmart, see page 47. ¹Available capacity of hard drive may be less due to preinstalled software. ²Bonus case & USB Key by redemption from Lenovo. See www.lenovo.com.au/worldsbest for terms, conditions and redemption details. Redemption postage fees apply. ³Bonus 2GB Micro Vault only available while stocks last.

Meet the Featherweight

At 1kg, up to 12.5 hours of battery and a dual core processor, it's packing the punch of a heavyweight.

**Luxury with all the Trimmings**

The freedom and mobility of 1.2kgs with full capabilities such as integrated optical drive.

**Built for Business Use**

Engineered from the ground up for the premiere travelling business professional.

**Portege R500****TOSHIBA**

- Intel Core 2 Duo ULV U7600 1.2GHz
- 1GB DDR2 RAM
- 120GB* Hard Drive
- DVD SuperMulti ±Dual Layer Drive
- **12.1" WXGA Widescreen**
- Wireless LAN 802.11a/g/n
- Bluetooth v2.0
- Windows Vista Business
- 3 year warranty



Pre-Order Now
Limited Stock!

0.99 kg**BONUS****VAIO TZ17GNB****SONY**

- Intel Core 2 Duo U7600 1.2GHz ULV
- 1GB DDR2 RAM
- 100GB* Hard Drive
- DVD SuperMulti ±Dual Layer Drive
- **11.1" WXGA LED Widescreen**
- Wireless LAN 802.11a/b/g
- Bluetooth v2.0
- Windows Vista Business
- 1 year warranty

**LIMITED STOCK!****1.2 kg****BONUS****VAIO G118GNT****SONY**

- Intel Core Solo U1500 1.3GHz ULV
- 1GB DDR2 RAM
- 100GB* Hard Drive
- DVD SuperMulti ±Dual Layer Drive
- **12.1" XGA LED Screen**
- Wireless LAN 802.11a/b/g
- Bluetooth v2.0
- Windows Vista Business
- 1 year warranty

**LIMITED STOCK!****1.15 kg**

\$3299 | V0645
RENT \$35.09/wk*

\$3599 | U9075
RENT \$37.58/wk*

\$3599 | U9068
RENT \$37.58/wk*

● **BONUS** 2GB MICRO VAULT²● **BONUS** 2GB MICRO VAULT²**Great Mobility Options** picked by John Lo - North Ryde Call Centre**Passport 250GB Portable Hard drive**

Pack up your office files and take them home.

\$279 | U9546

**460cb Portable Printer**

The freedom to print wirelessly on the go with a long lasting battery.

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**IP90v Portable Printer**

Desktop printer performance, in a portable, lightweight design.

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**Auto/Air Slimline Inverter**

Power almost any notebook or accessory in your car.

\$129 | U8315



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**ONLY
@ HT**

A55 + 19" LCD Monitor Bundle

- Intel Core 2 Duo E6300
- 2GB (2 x 1GB) DDR2 RAM
- 250GB# SATA Hard Drive
- 16x Dual Layer DVD±RW drive
- Microsoft Windows XP Professional
- 1 year limited on-site warranty
- Samsung 940BW LCD monitor

\$1479

V0827 | RENT \$16.58/wk*

WITHOUT MONITOR

\$1249

U9749 | RENT \$14.45/wk*

VT L460

acer



Windows Vista
Business

- Intel Core 2 Duo E4500
- 2GB DDR2 RAM (2 x 1GB)
- 320GB SATA Hard Drive
- 16x Dual Layer DVD Read/Write drive
- Microsoft Windows Vista Business
- 1 year on-site warranty

NEW

\$1225

V1800 | RENT \$14.17/wk*



Aspire L3600

acer



Windows Vista
Home Premium

- Intel Core 2 Duo E4500
- 2GB DDR2 667Mhz SODIMM RAM
- 500GB# SATA Hard Drive
- Slim Super Multi DVD Read and Write drive
- 2-piece desktop speakers
- Microsoft Windows Vista™ Home Premium Edition
- Aspire 1 Year Onsite Warranty
- Acer 19" wide Monitor

NEW

\$1599

V2714 | RENT \$15.03/wk*



Aspire E700

acer



Windows Vista
Home Premium

- Intel Core 2 Quad Q6600
- 2GB 533MHz DDR2 RAM (2 x 1GB)
- 500GB SATA Hard Drive
- 16x Dual Layer DVD Read/Write drive
- PCIe x16 -ATI Radeon X1550 with up to 512MB HyperMemory
- Microsoft Windows Vista Home Premium
- 3 year onsite warranty

\$2299

V0515 | RENT \$24.93/wk*



dc7700 SFF



Windows XP
Professional

- Intel Core 2 Duo E6300
- Intel vPro technology
- 1GB DDR2 667MHz RAM
- 80GB SATA Hard Drive
- 16x Dual Layer Read/Write Drive
- Intel Graphics Media Accelerator 3000
- Microsoft Windows XP Professional
- 3 year onsite warranty



\$1149

V2285 | RENT \$13.29/wk*

**6 SMART
REASONS TO RENT**

1. Affordable monthly repayments
2. Save your money
3. Tax deductible

4. Always have the latest equipment
5. Get more equipment
6. Fast approval



dx2300 MT



Processor	Intel Pentium Dual Core E2140	Intel Pentium Dual Core E2140
Clock Speed	1.6GHz	1.6GHz
RAM	512MB DDR2 RAM	1GB DDR2 RAM
Hard Drive#	80GB# SATA	160GB# SATA
Optical Drive	16x DVD±RW Dual Layer	16x DVD±RW Dual Layer
Operating System	Windows® XP Professional	Windows® XP Professional
Warranty	1 year	1 year
Price	\$749 V2155 RENT \$8.66/wk*	\$899 V1575 RENT \$10.40/wk*
Price w/19" Monitor	\$999 V2360 RENT \$11.56/wk*	\$1199 V2218 RENT \$13.87/wk*

ONLY @ HT!

A55

lenovo



- Intel Core 2 Duo E6300
- 1GB 667MHz DDR2 RAM
- 160GB SATA Hard Drive
- 16x Dual Layer DVD Read/Write drive
- Internal Speaker
- Intel Graphics Media Accelerator 3000
- Microsoft Windows XP Professional
- 1 year limited onsite warranty

**\$1049**

U9751 | RENT \$10.98/wk*

Veriton VT7900

QUAD CORE PROCESSOR

- Intel Core 2 Quad Q6600
- Intel vPro Technology
- 2GB DDR2 RAM (2 x 1GB)
- 320GB SATA Hard Drive
- 16x Dual Layer DVD Read/Write Drive
- Intel Graphics Media Accelerator 3000
- Microsoft Windows XP Professional
- 3 year onsite warranty

acer



Windows XP Professional

NEW

ONLY
@ HT**\$1299**

S9579 | RENT \$15.03/wk*

A61e ThinkCentre
USD

lenovo



ULTRA EFFICIENT

- AMD Athlon X2 BE 2350
- 1GB 667MHz DDR2 RAM
- 160GB SATA Hard Drive
- 16x Dual Layer DVD Read/Write drive
- Integrated ATI Radeon X1200
- Microsoft Windows Vista Business
- 1 year limited onsite warranty

**\$949**

U5408 | RENT \$10.98/wk*

dx7400

- Intel Core 2 Duo E4400
- 1GB 667MHz DDR2 RAM
- 80GB SATA Hard Drive
- 16x Dual Layer DVD Read/Write drive
- Intel Graphics Media Accelerator 3100
- Microsoft Windows Vista Business
- 1 year limited onsite warranty
- HP L1906 19" LCD Monitor
- HP Photosmart C4385 all-in-one



Windows Vista Business

**\$1399**

V2325 | RENT \$10.98/wk*

*For terms and conditions, including RentSmart, see page 47. *Accessible capacity of hard drive may be less due to preinstalled software.

SAMSUNG



940N

- Viewable Image: 19"
- Interface: Analogue
- Resolution: 1280 x 1024
- Contrast Ratio: 700:1
- Brightness: 300 nits
- Response Time: 5ms
- Tilt and wall mountable
- Warranty: 3 year on-site exchange and zero dead pixel policy



\$309 SILVER | U5078
BLACK | U5076

740N

- Viewable Image: 17"
- Interface: Analogue
- Resolution: 1280 x 1024
- Contrast Ratio: 600:1
- Brightness: 300 nits
- Response Time: 5ms
- Tilt and wall mountable
- Warranty: 3 year on-site exchange and zero dead pixel policy



\$279 SILVER | S9511
BLACK | S9509

AL2416WD

- Viewable Image Size: 24" Widescreen
- Interface: Analogue/Digital
- Resolution: 1920 x 1200
- Contrast Ratio: 1000:1
- Response Time: 6ms
- Brightness: 500 nits
- Vesa Wall Mounting 100 x 100 mm
- 3 years Warranty



\$599

A7514 | RENT \$6.93/wk*

305T

STUNNING IMAGE QUALITY

- Viewable Image: 30"
- Interface: Digital
- Resolution: 2560 x 1600
- Contrast Ratio: 1000:1
- Brightness: 400 nits
- Response Time: 6ms
- Built-in Wall-Mount Vesa: 200x100
- Warranty: 3 year on-site exchange and zero dead pixel policy



\$1999

U6636 | RENT \$22.41/wk*

Apple 23" Cinema HD Display LCD



Authorised Solutions Reseller



- Viewable Image Size: 23" Widescreen
- Interface: Digital
- Resolution: 1920 x 1200
- Contrast Ratio: 700:1
- Brightness: 400 nits
- Sleek anodised aluminium case

\$1399 | T8637 | RENT \$15.69/wk*

X193WS

- Interface: Analogue/Digital
- Resolution: 1440 x 900
- Contrast Ratio: 2000:1
- Brightness: 300 nits
- Response Time: 5ms
- Stunning image quality
- Warranty: 3 years limited

\$299

SILVER | V2238
BLACK | V2648



6 SMART REASONS TO RENT

1. Affordable monthly repayments
2. Save your money
3. Tax deductible
4. Always have the latest equipment
5. Get more equipment
6. Fast approval

RENTSMART
Because buying isn't

SAMSUNG



206BW/226BW

THE ULTIMATE IN PERFORMANCE

- Viewable Image: 20"/22" Wide
- Interface: Analogue/Digital
- Resolution: 1680 x 1050
- Contrast Ratio: 3000:1
- Brightness: 300 nits
- Response Time: 2ms
- Warranty: 3 year on-site exchange and zero dead pixel policy

\$389 | U5892 | 20"

\$549 | U5893 | 22"

2MS
RESPONSE
TIME

245B

- Viewable Image: 24" Wide
- Interface: Analogue / Digital
- Resolution: 1920 x 1200
- Contrast Ratio: 3000:1
- Brightness: 400 nits
- Response Time: 5ms
- Height Adjustable & Swivel & Tilt
- Warranty: 3 years on-site exchange and zero dead pixel policy



NEW

\$849
V2083 | RENT \$10.40/wk*

940BW

- Viewable Image: 19" Wide
- Interface: Analogue/Digital
- Resolution: 1440 x 900
- Contrast Ratio: 500:1
- Brightness: 300 nits
- Response Time: 4ms
- Wall mountable and height adjustable
- Warranty: 3 years on-site exchange and zero dead pixel policy

\$330 BLACK | U3759
SILVER | U2943HOT
PRICE

NEW

X223WB

- Viewable Image: 22" Wide
- Interface: Analogue/Digital
- Resolution: 1440 x 900
- Response Time: 5ms
- Contrast Ratio: 2500:1
- Brightness: 300 nits
- Warranty: 3 years limited

\$389 | V2640

Also available: BLACK | \$389 | V2239

FA-19W

- Viewable Image: 19" Wide
- Interface: Analogue/Digital
- Resolution: 1440 x 900
- Response Time: 5ms
- Contrast Ratio: 500:1
- Brightness: 300 nits
- Built-in Speakers
- 3 years limited warranty

HOT
PRICE

\$289 | V1324

*For terms and conditions, including RentSmart, see page 47.

TDP-P8

ULTRA LIGHTWEIGHT

- DLP technology
- XGA resolution
- 1500 ANSI Lumens
- 2100:1 contrast ratio
- Compact 1.0kg

TOSHIBA

- Perfect combination: extremely mobile and bright
- Includes soft carry case and remote
- 3 year warranty²



\$2399 T3878 | RENT \$26.01/wk*

BONUS ALUMINIUM BRIEF CASE + REPLACEMENT LAMP¹

TDP-S35

- DLP Technology
- SVGA Resolution
- 2000 ANSI Lumens
- 2000:1 Contrast ratio
- Compact 3.0kg

TOSHIBA

- Integrated speaker
- Includes soft carry case and remote control
- 3 year warranty

TDP-T45

- DLP technology
- XGA resolution
- 2500 ANSI Lumens
- 2000:1 contrast ratio

TOSHIBA

- Includes soft carry case and remote control
- 3 year warranty²



\$1249
T8918 | RENT \$14.45/wk*

BONUS ALUMINIUM BRIEF CASE + REPLACEMENT LAMP¹



\$1899
T8919 | RENT \$21.29/wk*

BONUS ALUMINIUM BRIEF CASE + REPLACEMENT LAMP¹

XD1270D

- DLP technology
- XGA resolution
- 2300 ANSI Lumens
- 2000:1 contrast ratio
- Weight: 2.2kg
- Infrared Movement Detection Technology
- Includes Remote Control
- 2 years limited warranty

acer



PD-323

- DLP technology
- XGA resolution
- 1600 ANSI Lumens
- 2000:1 contrast ratio

acer

- Weight: 1.3kg
- Includes remote control
- 2 years limited warranty



\$1399
U5061 | RENT \$15.69/wk*

WITH PROJECTOR SCREEN

\$1499
V0880 | RENT \$16.81/wk*

\$1835
U5034 | RENT \$20.58/wk*

* For terms and conditions, including RentSmart and Online Only, see page 47. ¹Toshiba Projector Replacement Lamp and Aluminium Brief case via redemption. See www.toshiba-redemption.com.au for full terms and conditions. Redemption postage fees may apply. ²3 years part and labour quality assurance warranty with 90 day lamp and faulty product replacement.

**TDP-T9****TOSHIBA**

- DLP technology
- XGA resolution 1024 x 768
- 2000 ANSI Lumens
- 2000:1 contrast ratio
- Weight: 2kg

- Password security & control Panel Lock
- ECO Mode: reduces noise and extends lamp life
- Includes soft carry case and remote control
- 3 years part warranty²

\$1499

T6349 | RENT \$20.17/wk*

● **BONUS** ALUMINIUM BRIEF CASE + REPLACEMENT LAMP²

X3000

- LCD technology
- XGA resolution
- 3000 ANSI Lumens
- 400:1 contrast ratio
- Compact 2.5kg

- Password security & control panel lock
- Includes carry case and remote with laser pointer
- 3 year warranty²

**\$2399**

U5344 | RENT \$26.01/wk*

● **BONUS** ALUMINIUM BRIEF CASE + REPLACEMENT LAMP¹

TDP-TW100

- DLP technology
- XGA resolution (1024 x 768)
- 2600 ANSI Lumens
- 2000:1 contrast ratio
- Wireless Technology

- Password security & control Panel Lock
- Includes soft carry case and remote control
- 3 year warranty²

**\$2899**

T6348 | RENT \$30.84/wk*

● **BONUS** ALUMINIUM BRIEF CASE + REPLACEMENT LAMP¹

VPL-EX4**SONY**

- 3LCD Technology
- XGA resolution
- 2100 ANSI Lumens
- Macintosh compatible
- Multiple inputs
- Password security and control panel lock

- Low power Consumption: (2.3 watts - 5 watts in standby mode)
- Quick Start-up
- 2 years limited warranty

**\$1599**

U8285 | RENT \$17.93/wk*

VPL-CX21**SONY 3LCD**

- 3LCD Technology
- XGA resolution
- 2100 ANSI Lumens
- Accepts Digital TV signals, including HDTV up to 1080/50i
- Multiple inputs

- Password security and control panel lock
- Image flip and image freeze function
- Includes soft carry case and remote
- Warranty: 2 years limited

**\$2429**

A7588 | RENT \$26.34/wk*

WITH PROJECTOR SCREEN

\$2529

V0875 | RENT \$27.42/wk*

CoPilot Live Pocket PC V6 Bundle

**NAVTEQ
ON BOARD**

CoPilot Live turns your Pocket PC PDA* or Smartphone* into a complete GPS navigation system.

- Enhanced 3D map display
- Finger touch menus and options screen
- Customisable Routing Profiles
- Easier Points of Interest
- Fully compatible with the Windows Mobile 5 OS
- Also includes Emtac GPS bluetooth receiver with sirf III technology and car mount

*Device must be Bluetooth compatible.

\$299 | U9087



**SAVE
\$50**

iPAQ rw6828 Mobile Messenger Bundle



The rw6828 Bundle includes 1GB mini-SD, additional 1530mAh standard battery, 1 additional stylus and 1 additional flip cover.

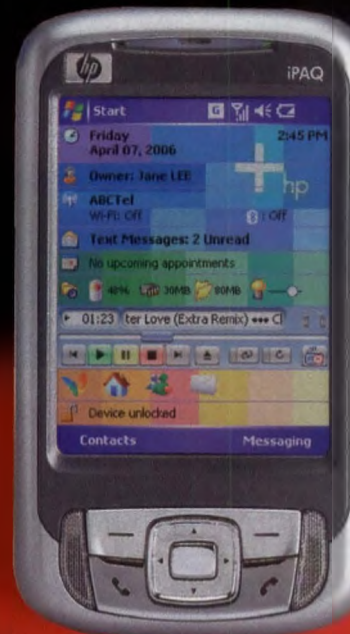
- Intel® PXA272 416MHz processor
- 128MB ROM/64MB SDRAM
- 2.7" TFT LCD 240x320 resolution
- 2 megapixel mini-SD
- Tri-Band GSM/GPRS/EDGE

**SAVE
\$100**

REDUCED TO CLEAR

\$699

U5842 | RENT \$8.09/wk*



iPAQ rx4540 Mobile Media Companion



Information technology professionals rely on HP quality to ensure maximum productivity. As the power of applications, processors, memory adapters and storage devices increases, high-end computer users are seeking ways to optimize their system performance. HP provides leading solutions, adding new levels of performance, availability, flexibility, and management.

**REDUCED
TO CLEAR**

\$399 | U1021



**SAVE
\$50**

iPAQ 112 Classic Handheld



The HP iPAQ 112 Classic Handheld is a stylish personal organiser for busy people from all walks of life. Designed to keep your life in balance, this sleek handheld is an affordable companion to your mobile phone.



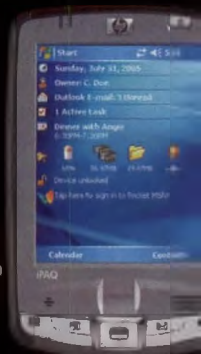
DUE MID NOV

\$399 | V1378

iPAQ hx2790 Pocket PC



- Intel® PXA270 624MHz processor
- 256MB total memory (128MB ROM and 128MB SDRAM); up to 185MB user available memory
- Display 3.5" transfective TFT QVGA; portrait and landscape mode
- MultiMediaCard, SD, and SDIO expansion card compatible
- Built-in Wi-Fi, Bluetooth® wireless technology, Serial IR
- Microsoft® Windows Mobile® 2003 2nd Edition for Pocket PC



\$699

T0898 | RENT \$8.09/wk*

ONE XL

- Large 4.3" high quality touchscreen
- Built-in Bluetooth® technology
- Easy-to-use navigation
- Portable, light and easy to handle
- Fast route calculation and re-routing if roadblocks occur
- Large choice of routes: including quickest, shortest and avoiding toll roads and congestion areas
- Crystal clear 3D or 2D graphics for perfect viewing day and night



\$499 | U8359

TomTom

GO720 GPS

TomTom GO is a stand-alone, portable and easy-to-use car navigation appliance that incorporates navigation software, maps and GPS receiver in one device. Navigation solutions are now accessible to everyone thanks to TomTom GO's ease-of-use, ease of installation and affordability. Complete car navigation solution in one box.



\$799 | V0788 | RENT \$9.24/wk*

TomTom

**6 SMART
REASONS TO RENT**

1. Affordable monthly repayments
2. Save your money
3. Tax deductible
4. Always have the latest equipment
5. Get more equipment
6. Fast approval

RENTSMART
Because buying isn't

Touch

Let your fingers guide you with the HTC Touch, the world's first touch phone that gives you a whole new touch panel experience. The HTC Touch with TouchFLO™ revolutionizes the way you use the touch screen by allowing finger scrolling and panning. It also features the Touch Cube which is a unique user interface that makes quick dialing and navigation a breeze.

Optimized for entertainment, the HTC Touch lets you enjoy your favourite music and movie clips on the go. It comes with a 1 GB microSD™ memory card for storing your media files.

Stylish, smart and versatile, the HTC Touch opens up a world of media, communication, and social interaction.

\$699

V2359 | RENT \$8.09/wk*



Specifications:

- Windows 6.0 Professional with direct push email and HTML email support
- Intuitive TouchFLO™ screen technology for finger and stylus input
- Simple user interface for quick dialing, navigation and launching applications
- Enjoy music and movie clips with HTC's Audio Manager and Windows Media® Player
- 1GB microSD storage card included / 64MB RAM, 128MB ROM
- Weight: 112g with battery
- Camera: 2.0 mega-pixel CMOS colour camera

NEW TO HARRIS TECHNOLOGY

Treo 680 Smartphone

Bring wireless mobile productivity to your small business with the all-in-one Palm® Treo® 680 Smartphone. It delivers full phone functionality plus wireless email, web browsing, messaging, document editing and more. Give your company a productivity boost and realise a quick return on investment with the Treo 680 – the ideal device for your growing business.

\$749

U4259 | RENT \$8.66/wk*



Tungsten TX

The Palm TX handheld is the affordable handheld with total wireless connectivity that you've been waiting for. With built-in Wi-Fi and Bluetooth technologies, you can check email, browse the web and work wherever you want. Its large colour display and sleek design are anything but business as usual.

\$479 | T0850



Tungsten E2

Wherever your life is going, this is the perfect handheld to take along for the ride. The sleek, stylishly designed Tungsten E2 handheld brings your entire world to life. Your calendar, contacts, documents, presentations, photos and videos look sharper and more colourful. But just as important, its new flash memory keeps all that information safe - even if you don't have time to recharge.

\$349 | U5825



S30 GPS

- Simple to use
- Great value for money
- Latest 2007 (R14) mapping
- Preloaded safety camera and red light camera alerts
- 2 Year warranty
- Slim, portable design – fits in your pocket
- Nearest fuel and parking short cuts
- Emergency services short cut
- Hi quality navigation and guidance

\$399 | V1308



iPAQ rx5765 Travel Companion

- Integrated SiRFstarIII GPS receiver
- Integrated omni-directional GPS antenna
- Navigation software and maps pre-installed
- Samsung 400MHz processor
- Secure Digital (SD/SDIO) expansion slot
- 3.5" QVGA touch screen panel with antiglare

REDUCED TO CLEAR
\$499 BEFORE CASHBACK
YOU PAY \$599

U1293 | RENT \$6.93/wk*



*For terms and conditions, including RentSmart, see page 47. *Buy the HP iPAQ rx5765 or rx5965 Travel Companion between 01/08/07 and 30/11/07, and receive \$100 cashback via redemption from HP. Visit hp.ht.com.au for further details. Postage charges may apply.

Pearl™ 8100™ Smartphone

BlackBerry

Handset features:

- Phone, email, browsing, address book
- GSM/GPRS/EDGE
- Instant messaging, SMS, MMS
- Media player (music, pictures, video)
- Speakerphone and voice activated dialling
- Bluetooth™ enabled



\$699

OUTRIGHT | U7928

\$0 UPFRONT

on a \$60 Telstra Business Phone Plan over 24 months²

**SAVE
\$100**

For the mobile office professional

Telstra Dealer

NEXT G™ NETWORK

palm

Treo 750 Smartphone

Handset features:

- Microsoft Windows® Mobile 5 operating system
- Microsoft Office® Word, Excel, PowerPoint and PDF Viewer
- Voice command for speed dialling or calendar access
- Built-in Bluetooth™ wireless technology
- 1.3 megapixel digital video camera
- 128MB memory
- Windows® Media Player for music and video

BONUS

\$999

OUTRIGHT | U7664

\$0 UPFRONT

on a \$80 Telstra Business Phone Plan over 24 months²

BONUS Bluetooth Headset



Mobile Phones for Business

3 WAYS TO BUY

1. Outright

Use your existing service

2. Phone Plan

\$0 Upfront (for phone & service) on selected Personal & Business Phone Plans for 24 months

3. Mobile Repayment Option

Choose an approved Member Plan and use the monthly Member Credit to assist with the handset repayment for 12 or 24 months.

Ask in-store for further details



Nokia 6120

NOKIA

Handset Features:

- High speed 3G or HSDPA Internet connection
- Email capability with attachments
- Video recorder
- 2 megapixel camera with flash
- Video calling
- 2GB expandable memory
- Calendar and PC synchronisation
- Music player

NEXT G™ NETWORK

\$499

OUTRIGHT | V0587

\$0 UPFRONT

on a \$30 Telstra Business Phone Plan over 24 months²

*For terms and conditions, including Online Only, see page 47. ¹Minimum cost is \$1,416 plus usage charges. Early exit fees apply. Telstra Mobile Broadband devices are programmed to operate only on Telstra's Next G™ and GSM networks. If you would like to use a non Telstra SIM in the Telstra Mobile Broadband devices, a network unlocking fee will apply.

Telstra Turbo Modem (Next G™) USB

Features:

- Coverage on Telstra's Next G™ network
- Broadband connection, with average speeds of 550Kbps to 1.5Mbps, and a peak network downlink speed of 3.6Mbps⁴ on the Next G™ network
- HSDPA 14.4Mbps support
- Windows™ compatible
- Plugs straight into your laptop through your USB port
- Small, lightweight design and build



\$599

OUTRIGHT | U7929

\$0 UPFRONT

on a new \$59 Data Pack Plan over 24 months¹



JASJAM

i-mate

Handset features:

- Fast 1.8Mbps connection through Next G™ Network
- 2 megapixel camera
- Bluetooth™ enabled
- Email capability
- Video calling/video messaging
- Battery talk time: up to 5 hours



\$1299

OUTRIGHT | U7665

\$0 UPFRONT

on a \$80 Telstra Business Phone Plan over 24 months²

BONUS Car Charge + Carry Case

i601 BlackJack

SAMSUNG

Handset features:

- Microsoft Windows™ Mobile operating system
- Multi document viewer
- Email capability
- Full QWERTY keyboard

- Video recorder
- 1.3 megapixel camera
- Media player
- Bluetooth™ enabled
- 42MB of internal memory
- Battery talk time: up to 6.5 hours



SAVE \$100



\$899

OUTRIGHT | U7920

\$0 UPFRONT

on a \$60 Telstra Business Phone Plan over 24 months²



Motorazr Maxx V6

Handset Features:

- Bluetooth™ enabled
- 2 megapixel camera
- Email capability
- Video calling/video messaging



SAVE \$100



\$629

OUTRIGHT | U7667

\$0 UPFRONT

on a \$40 Telstra Business Phone Plan over 24 months²

⁴ Minimum package cost on the \$30 Telstra Business Phone Plan is \$720, \$40 Telstra Business Phone Plan is \$960, \$60 Telstra Business Mobile Phone Plan is \$1,440, \$80 Telstra Business Mobile is \$1,920 (for phone and service). Extra usage (incl. data & content) charges are additional. Early termination charges may apply. ABN required.

Get the freedom of internet access in most places across Australia with BigPond Wireless Broadband. With the Next G™ Network, BigPond now offers wireless broadband speeds to 98% of the Australian population², so it's easy for you to access the internet from home, in the office or on the road.



Wireless Card Self Install Kit
\$299 | U8552



Wireless USB Self Install Kit
\$299 | U8553



Wireless Modem Self Install Kit
\$249 | U8551

Netgear DG834GV Wireless Modem/Router with VoIP

DG834GV Integrated Gateway is the power in your network. Six products in one, it combines an ADSL2+ Modem, Router, 10/100 Wired LAN Switch, 802.11g Wireless Access Point, Voice-over-IP (VoIP), and SPI Double Firewall. Plug in your ADSL line and soon you can share your broadband connection to the Internet with all of your networked computers.

\$259 | U9695



NETGEAR

SPH200D Dual-Mode Cordless Phone

- Make Free Skype calls to other Skype users without a PC
- Use SkypeOut to make long distance calls for pennies and minute and no monthly fees
- Crystal clear reception with DECT technology
- Expandable up to 4 handset off one base station

\$320 | U8072



NETGEAR

Uniden
SOUNDS BETTER

Uniden WDECT 3300 Series

WDECT
WIDEBAND DIGITAL



WDECT3315

WDECT Technology
Multi 4 handset capabilities
Advanced Alpha ID Display
Two-way communications
Digital duplex speakerphone

1 Handset

\$76 | U9317

WDECT3315+1

WDECT Technology
Multi 4 handset capabilities
Advanced Alpha ID Display
Two-way communications
Digital duplex speakerphone

2 Handset

\$99 | U9318

WDECT3355

WDECT Technology
Multi 4 handset capabilities
Advanced Alpha ID Display
Two-way communications
Digital duplex speakerphone

1 Handset

Answering Machine

\$99 | U9320

WDECT3355+1

WDECT Technology
Multi 4 handset capabilities
Advanced Alpha ID Display
Two-way communications
Digital duplex speakerphone

2 Handsets

Answering Machine

\$142 | U9319

WDECT3355+2

WDECT Technology
Multi 4 handset capabilities
Advanced Alpha ID Display
Two-way communications
Digital duplex speakerphone

3 Handsets

Answering Machine

\$189 | U9321

*For terms and conditions, see page 47. *Purchase the Engin Voicebox 3 or VoiceBox 3102 between 01/10/2007 and 30/11/2007 to receive \$100 cashback via redemption from Engin. Visit engin.ht.com.au for further details. Postage extra. *To call over Broadband with Engin, minimum 512Kbps broadband connection recommended. To be valid for this offer, customer must purchase an Engin Voice Box, Internet Phone or Engin enabled router from any participating retail store. Not valid for online or phone.

Uniden
SOUNDS BETTER

5.8
DIGITAL
SPREAD SPECTRUM



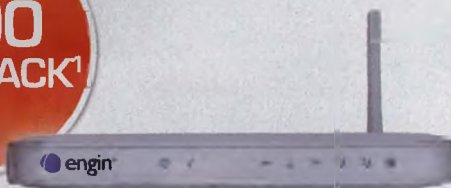
DSS7960+1 Dual Line Phone

- Premium 5.8GHz Digital Spread Spectrum Phone System
- Advanced LCD and caller ID display
- Multi handset capable (up to 10)
- Distinctive caller ID indicators
- Digital duplex speakerphone on handset
- Downloadable/preset picture displays

\$269 | U4664

engin™

**\$100
CASHBACK!**



VoiceBox 3

The ultimate box

- All in one unit allowing you to connect multiple devices such as PCs and notebooks wirelessly to broadband
- ADSL2 plus modem
- Allows you to run two phone lines

\$249 | T7230

harris technology

ht



VoiceBox 3102

- Have you got broadband?
 - Want 10 cent phone calls Australia wide?
 - Want the option to use your existing phone number?
 - Have a home or office phone?
- This product allows you all of the above plus includes an in-built router should you need one

\$129 | U9016

WDECT 2345+1 Cordless Phone System

Uniden
SOUNDS BETTER

- 2 in 1 Digital Phone System with Multi Handset Capabilities
- 2.4GHz WDECT Wideband Digital Technology
- Advanced LCD and Caller ID Display



\$149 | U0403

CIT200 Cordless Internet Telephony Kit

LINKSYS®
A Division of Cisco Systems, Inc.

- Skype convenience
- USB base station connects to your PC and puts your Skype contact list on the handset's screen

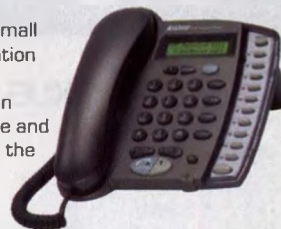


\$169 | T3126

V85 VoIP Desktop Phone

NetComm®

- The ideal SOHO/Small business workstation IP Phone
- Built-in PC port can connect the phone and a computer using the one network port



\$169 | 35010

Uniden DSS7900 Series

5.8
DIGITAL
SPREAD SPECTRUM



DSS7915+1

DSS7955

DSS7955+1

DSS7955+1WP

DSS7955+2

5.8GHz Digital	5.8GHz Digital	5.8GHz Digital	5.8GHz Digital	5.8GHz Digital
Multi 10 handset capabilities	Multi 10 handset capabilities	Multi 10 handset capabilities	Multi 10 handset capabilities	Multi 10 handset capabilities
WiFi Network Friendly	WiFi Network Friendly	WiFi Network Friendly	WiFi Network Friendly	WiFi Network Friendly
Optimum Clarity & Security	Optimum Clarity & Security	Optimum Clarity & Security	Optimum Clarity & Security	Optimum Clarity & Security
2 Handsets	1 Handset	2 Handsets	2 Handsets	3 Handsets
	Integrated Digital Answering Machine	Integrated Digital Answering Machine	Integrated Digital Answering Machine	Integrated Digital Answering Machine

100% Water and Dust Proof
Additional Handset

\$171 | U9323

\$171 | U9324

\$219 | U9325

\$256 | U9327

\$266 | U9326

sales Offer not available to business customers. Customer must create an account, select the Home Plus plan and pay the first month's monthly service fee of \$19.95 to be valid to receive the 2 free months. 2 months free service will be given in months 2 and 3. Total value is \$39.90. Available on Engin services activated by 31st October 2007 unless withdrawn earlier. Fair Use policy applies. Cannot be used in conjunction with any other offer. Excludes calls to international mobiles and special services. Free countries on Home Plus include Canada, France, Germany, Ireland, Netherlands, Spain, UK and USA.

Digital Cameras

OLYMPUS SP-550UZ

- 7.1 megapixels
- 18x optical zoom
- 28MM wide angle lens
- Dual shakeproof image stabiliser system
- 2.5" LCD screen and electronic view finder
- Nightproof pictures
- Movie mode with sound



SAVE \$30

CLEARANCE

\$619

|U5390|RENT \$8.09/wk*



SONY DSCH7

- 8.1 megapixels
- 2.5" LCD screen
- 15x optical zoom
- Carl Zeiss Vario-Tessar lens
- Full HD 1080 Output
- BIONZ processor
- Super SteadyShot
- Face detection

\$649

|U9124|RENT \$8.09/wk*

SAVE \$50

Canon IXUS



IXUS 70S DiGIC III

Inspired by the very first IXUS, the slender Digital IXUS 70 is a masterpiece of minimalist design. Equipped with leading Canon technologies, it offers performance to match its breathtaking looks.

\$330

|U6162

IXUS75 DiGIC III

With its cutting edge design and extra large LCD, the Digital IXUS 75 is styled to stand out. The DiGIC III processor and advanced features like Face Detection Technology ensure equally stunning results.

\$377

|U8906

OLYMPUS Mju



SAVE \$20



SAVE \$20

Mju 760

- 7.1 megapixels
- 3x optical zoom
- 2.5" LCD screen
- Splashproof
- Nightproof light
- sensitivity - up to ISO 2500
- Dual shakeproof anti blur mode + CCD shift stabiliser

CLEARANCE

\$279

|U5386

Mju 780

- All of the above plus:
- 5x optical zoom
- Nightproof light sensitivity - up to ISO 2500

CLEARANCE

\$329

|U8490

PENTAX Optio A20



10 MEGAPIXEL
3x OPTICAL ZOOM
2.5" SCREEN
111 MOVIE

The flagship of the Optio digital camera line, the high-end Pentax Optio A20 offers the pinnacle of Pentax compact digital photography in an ultra-compact aluminium alloy body.

CLEARANCE

\$369

|U6957

SAVE \$30

SONY DSCW55



HOT PRICE

- 7.2 Megapixels
- 3 x Optical Zoom
- Carl Zeiss Vario Tessar Lens
- High Sensitivity ISO 1000
- 2.5"LCD
- Up to 390 shots from one battery charge
- MPEG Movie VX Fine
- 56MB Internal Memory

\$299

|U7757

*For terms and conditions, including RentSmart, see page 47.



ProLiant ML115 Small Business Server Premium Bundle

harristechnology



- Proven HP dependability and support
- Expandable to grow with changing business needs
- A true server at a desktop price
- Bundled with Microsoft Small Business Server Premium Edition

Specifications

- Form Factor: 4U Tower
- Processor: Dual Core AMD Opteron 1210 1.8GHz, 2000Mhz, 2MB L2 cache
- Memory: 2GB (2 x 1GB) DDR2 MEMORY
- Disk Storage: 2 x 160GB SATA NHP 3.5" HDD
- HDD Controller: 4-port SATA controller with Embedded RAID (RAID 0,1,5)
- Network: Embedded NC320i PCI Express Gigabit Svr Adaptor
- Ports: 8 USB (2 Int, 2 Front, 4 Rear), 1 Serial, 2 PS2, 1 Graphics
- Expansion: 2x 32-bit/33MHz PCI at 3.3V slot, 2x PCI-Express slots (x8 & x16)
- (H/W/D): 367 x 175 x 426mm
- Weight: 10.5kg (approx.)

\$1799 | V0688
| RENT \$20.17/wk*

Also Available:

ML115 Small Business Standard Server Bundle | \$1249 | U7946
ML110G4 3G 2x1GB 2x160GB SATA GNIC SBS Premium | \$1799 | V0709
ML110G4 925 1GB 2x160GB SBS Standard Bundle | \$1499 | U9881

T1000 G2 UPS 1000VA 650W Serial USB

- Manageability through USB port
- Ease of configuration via enhanced front panel display
- Intelligent manageability with bundled Power Management software
- Long-term battery reliability with Enhanced Battery Management
- Hot-Swappable battery
- Enhanced system flexibility with independently controllable load segment
- Backed by a 3 year warranty, with the first year including parts and labour



SAVE 30% WHEN YOU PURCHASE THIS PRODUCT WITH ANY HP PROLIANT ML SERIES SERVER Price with Server **\$455**

\$650 | U5222 | RENT \$7.52/wk*

Surge Protector with Battery Backup 600VA

BELKIN

- Protects equipment from damage caused by power disturbances including blackouts
- Increases the life of your equipment by filtering common electrical fluctuations
- 3 battery backup with surge protection sockets and 3 surge protected only sockets
- RJ11/RJ45 surge protected combo port for telephone and data lines



\$279 | V1023

Also available:
400VA | \$179 | V1022

ServerLink SL-261 Dual 2 Port USB/PS2 KVM Switch



- Desktop USB + PS/2 KVM switch with audio and microphone switching
- Supports USB or PS/2 computers on every port
- Supports USB or PS/2 on console side
- Built-in 2 port USB hub for sharing USB devices



\$149 | T7536

ServerLink Slim 4 Port KVM Switch



- Control 2/4 computers from one keyboard, monitor and mouse
- Ideal for individual and SOHO use
- Hot-plugging of PC without powering down the KVM or PC
- Compatible with PS/2 style desktop and notebook PCs



\$159 | Q5543

XESPB103 Space- saving Powerline Network Extender Kit

NETGEAR

- Extends secure Powerline network connections to any electrical outlet
- Reduces clutter—one plug supplies both power and network connections
- Ideal to power a Netgear wireless router and extend an Internet connection to a set-top box, game console or computer
- Simple plug-and-play installation



\$259 | U9560

DCS-3220G Wireless Internet Camera

D-Link

- Stand-alone Internet camera with CPU & RAM, no need to attach to PC
- Local access through Ethernet and built-in high-speed 802.11g wireless LAN
- 4x digital zoom for close-up viewing ^
- Listen and talk with 2-way audio ^^



\$849 | R5965 | RENT \$9.82/wk*

DCS-5300G 802.11g Wireless Internet Security Camera

D-Link

- Stand-alone Internet camera with CPU & RAM, no need to attach to PC
- Built-in rotation motor for manual or auto camera pan/tilt
- Sound surveillance through built-in microphone or external



\$1099 | R9200 | RENT \$12.71/wk*

DCS-6620G Wireless 10x Optical Zoom Internet

D-Link

- 802.11g Wireless Connectivity
- Motorized Pan/Tilt/Zoom
- User-Selectable Compression Codec - MJPEG and MPEG-4
- 2-Way Audio Support
- Extreme Low Light Sensitivity



\$1799 | T7341 | RENT \$20.17/wk*

Prosafe 24 Port 10/100 Stackable Smart Switch

NETGEAR

PROSAFE

NETGEAR
LIFETIME
WARRANTY

- 24 10/100Mbps ports
- 4 10/100/1000Mbps copper gigabit ports
- Smart Switch software with new advanced features
- Stacking via the built-in gigabit ports



\$599 | T4681 | RENT \$6.93/wk*

Prosafe 24 Port 10/100 Stackable Smart Switch

D-Link

- 24 10/100Mbps ports
- 4 10/100/1000Mbps copper gigabit ports
- Smart Switch software with new advanced features
- Stacking via the built-in gigabit ports



\$999 | V0677 | RENT \$11.56/wk*

GS724T 24 Port Gigabit Smart Switch

NETGEAR

PROSAFE

NETGEAR
LIFETIME
WARRANTY

- 24 10/100Mbps ports
- 4 10/100/1000Mbps copper gigabit ports
- Smart Switch software with new advanced features
- Stacking via the built-in gigabit ports



\$799 | N3147 | RENT \$9.24/wk*

Prosafe 24 Port 10/100 Stackable Smart Switch

D-Link

- 24 10/100Mbps ports
- 4 10/100/1000Mbps copper gigabit ports
- Smart Switch software with new advanced features
- Stacking via the built-in gigabit ports



\$1499 | V0793 | RENT \$23.54/wk*

FS116P PROSAFE 16 Port 10/100 PoE Switch

NETGEAR

PROSAFE

NETGEAR
LIFETIME
WARRANTY

- 16 auto speed-sensing 10/100 RJ-45 ports
- The sixteen Fast Ethernet ports can be used for any 10/100 Mbps link and eight of these ports can supply industry-standard IEEE 802.3af power



\$399 | S9450

FS728TP PROSAFE™ 24+4 10/100 Smart Switch w POE

NETGEAR

PROSAFE

NETGEAR
LIFETIME
WARRANTY

- Full 24 10/100 Smart Switch with 24 PoE Ports
- Four gigabit ports for high speed connections
- Easy-to-manage web-based GUI



\$879 | V2361 | RENT \$10.17/wk*

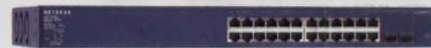
GS724TP 24 Port ProSafe Switch with POE

NETGEAR

PROSAFE

NETGEAR
LIFETIME
WARRANTY

- 24 10/100/1000BASE-T ports with POE support
- Up to 4 fiber links via combo SFP
- 10 gigabit bi-directional stacking bandwidth



\$2099 | U8870 | RENT \$23.54/wk*

DES-1228 24 Port 10/100 Switch + 2 COMBO GbE

D-Link

Building Networks for People

- Supports Industry Standards: 802.1p, 802.1Q, 802.1D
- CPU DoS Protection to Ensure Uptime
- Supports 802.1x User Authentication for Security
- Easy Management through GUI, Smart Console Utility, and SNMP v1



\$399 | V0789

DES-3028 24 Port 10/100 Switch + 2x GB Ports Rackmount

D-Link

Building Networks for People

- High Port Density 10/100 Switch
- Optimised for Low Cost & Rich Features
- 4 Gigabit Uplink Capacity
- 4K VLAN & ACL Support
- Secure/Effective Management with RADIUS/TACACS+ Single IP Management, SSH/SSL Support



\$599 | V0790 | RENT \$6.93/wk*

DES-3052 48 Port 10/100 Switch 2xGB Rackmount

D-Link

Building Networks for People

- High Port Density 10/100 Switch
- Optimised for Low Cost & Rich Features
- 4 Gigabit Uplink Capacity
- 4K VLAN & ACL Support
- Secure/Effective Management with RADIUS/TACACS+ Single IP Management, SSH/SSL Support



\$1195 | V0792 | RENT \$13.83/wk*

*For terms and conditions, including RentSmart, see page 47

NETGEAR
DG834N RangeMax NEXT
ADSL Modem/Router

- Complies with draft 802.11n, backwards compatible with 802.11b/g
- Interoperates at 270Mbps with other products powered with Intensi-fi
- Ensures optimal performance with internal antenna design

**\$339** | T7509**D-Link**
DSL-2740B RangeBooster N™
ADSL/ADSL2+/2+ Modem Router

- Built-in ADSL/ADSL2+/ADSL2+ modem
- Draft 802.11n wireless LAN specification, backward compatible with 802.11b/g devices
- Multiple SSIDs
- Up to 270Mbps raw data transfer rate
- Strong WPA/WPA2 data encryption security

**\$389** | U6165**LINKSYS**
WAG325N Wireless Draft N
ADSL2+ Gateway

- High-speed ADSL2+ modem gives you a fast, "Always On" connection to the internet
- Connect your PCs via the built-in router and 4 port switch to jump start your Ethernet network and share the internet throughout the building
- Built-in Wireless N (draft 802.11n) access point also lets you connect without running wires - up to 12 times as fast as Wireless G

**\$298** | U5679**GOOD****BETTER****BEST****NETGEAR**
WGR614 Wireless
G Router + 4 Ports

- Faster Speeds up to 54Mbps in 2.4GHz mode
- Share your Cable/DSL Internet connection - with or without wires!
- Smart Wizard - automatically detects and connects to your ISP
- True Firewall with SPI and NAT protection
- Easy set up with interactive install tutorial

**\$89** | J2416**WPN824 RangeMax**
Wireless G Router

- Up to 1000% more wireless coverage and speed than 802.11g
- RangeMax™ Smart MIMO (Multi-In, Multi Out) Technology
- 7 Internal Smart Antennas adapt on the fly to interference
- SmartWizard™ Installation Assistant
- 100% compatible with 802.11b, 802.11g, and SuperG* devices

**\$139** | R5401**WNR834B RangeMax**
NEXT Wireless Router

- Speeds of up to 270Mbps and is compliant with draft 802.11n
- Delivers a steady-stream reliable connection that supports multiple simultaneous users and applications
- Far outperforms legacy 802.11 G standard

**\$239** | T7507**WNR854T Wireless N Router with**
4 Gigabit Ports | \$369 | U5282**D-Link**
DIR-615 Wireless N Router

- Share internet access with PCs, game consoles, and media players
- Parental controls to supervise internet activity
- Firewall protection for your network
- Backward compatible with 802.11g and 802.11b networks

**\$199** | V2323**DIR-635 RangeBooster N 650**
Wireless Router

- QoS engine and draft 802.11n technology for total network performance
- Active Firewall and WPA2™ to protect your network against outside intruders

**\$229** | T9473**DIR-655 Xtreme N™ Gigabit Router**

- Draft 802.11n speeds up to 14x faster than Wireless G
- Greater coverage for entire home or office
- Intelligent QoS technology for superior VoIP and online gaming
- Connect computers, game consoles, or media players to the web

**\$289** | U5726**LINKSYS**
WRT54G Wireless-G
Broadband Router + 4 Ports

- All-in-one internet-sharing router, 4 port switch, and Wireless G (draft 802.11g) access point
- Wireless data rates up to 54Mbps - 5 times faster than Wireless B (802.11b)
- Advanced wireless security with 128-bit WEP encryption, MAC or IP address filtering
- 3 year limited warranty

**\$99** | H9739**WRV200 Wireless-G VPN**
Router with RangeBooster

- RangeBooster (MIMO) technology for dramatically increased range
- SPI Firewall, Encryption, and VPN support
- Multiple BSSIDs and VLANs provide separate secure networks
- Enhanced QoS for both Wireless and wired provide improved quality voice/video

**\$149** | T9822**WRT350N Wireless N Gigabit**
Router with Storage Link

- Internet-sharing router and 4 port gigabit switch, with a built-in speed and range enhanced wireless access point
- MIMO technology - 4 times farther and reduces dead spots
- Up to 12x faster than Wireless G

**\$349** | U7882**WRVS4400N Wireless N Gigabit Security**
Router/VPN | \$369 | U1235

Multimedia

Solutions for Storing, Streaming and Accessing all your multimedia files across your home or small business network

TeraStation Live™ 1TB Network Storage

- Built-in DLNA CERTIFIED™ Media Server
- RAID 0/1/5/10
- 4 Quick-Swap Serial ATA hard drives
- Gigabit networking
- Advanced RAID system continually checks hard drive and RAID performance



• WEB ACCESS FEATURE
See www.buffalo-asia.com/web_access/index.html for more information

BUFFALO

\$1099 | V0671 | RENT \$12.71/wk*
2TB | \$1799 | V0672 | RENT \$20.17/wk*

EVA8000 HD Digital Entertainer **NETGEAR**

- Streams movies, videos, music, Internet radio, and photos from your home PCs and storage devices to your HDTV
- Automatically finds all the digital media files on your home network and organizes them into an easily accessible library
- Play YouTube™ Videos on your TV
- **PC World Best Buy** (www.pcworld.com/article/id,133190/article.html)



\$599 | U7492 | RENT \$6.93/wk*

My Du@l Radio 700 Wireless Media Server/MP3 Player

- WiFi Internet Radio
- FM Radio - RDS
- Media Server
- USB MP3 Player
- Alarm



SAVE \$100

\$199 | U7959

Archival Storage

Can you afford to lose data if something happens to your computer or small business?

Harris Technology has a number of different solutions to help you back up and archive business critical data and also help you with many disaster recovery scenarios. Backing up to disk or tape media allows you to take home your precious memories or sensitive data at the end of the day, giving you an extra level of security and peace of mind.

REV 70GB USB 2.0 External Drive

- 70GB native capacity on each removable disk
- Compressed capacity 140GB*
- Transfer rate up to 30MB/s
- Two-stage error correction (ECC) for automatic data verification and correction
- Zero maintenance required with Automatic Internal Head Cleaning and Air Filtration
- 30-year shelf life on Iomega REV disks
- Compatible with today's most common backup software titles
- Drive: 3 year warranty, Disk: 5 year warranty
- Includes EMC Retrospect Express (Backup & Disaster Recovery) software



iomega

70GB SBS Data Protection Suite Option | \$543 | U5833
REV 70 5PK Disk | \$525 | U0163

\$899 | U0162 | RENT \$10.40/wk*

Odyssey Dock with 120 GB Hard Disk Cartridge

- Expandable - Docking system is forward compatible with next-generation hard disk cartridges as they enter the market
- Speed and Convenience - With the added benefit of removability, the Odyssey system minimises the time needed for backup and restore operations while drag-and-drop file access makes moving data easy
- EMC® Retrospect® Backup Software - Includes the full version of EMC Retrospect backup software featuring password protection and 256-bit AES encryption to help prevent unauthorised users



imation

\$499 | V0896
80GB | \$385 | V0895

DAT 72 USB External Tape Drive

- Protect your business, remote office or workgroup with the HP StorageWorks DAT 72 USB Tape Drive providing a balance of price and performance with up to 72GB of compressed data on a single cartridge at speeds of up to 23GB/hr (assuming 2:1 data compression).
- Up to 36GB native capacity on a single tape
- Dependable disaster recovery - HP StorageWorks One-Button Disaster Recovery (OBDR) restores your entire system at the touch of a button
- The USB 2.0 interface provides plug-and-play connectivity, enabling backup to be initiated from straight out-of-the-box in less than 60 seconds

***SAVE 30% WHEN PURCHASED WITH ANY HP ML SERIES SERVER PRICE WITH SERVER \$810**



SAVE 30%*

\$1158 | T3491 | RENT \$13.40/wk*

*For terms and conditions, including RentSmart, see page 47.

Network Attached Storage (NAS)

What is NAS?

Network Attached Storage (NAS) is dedicated hard disk based storage technology designed to be connected directly to a computer network, providing centralised data access to multiple network clients.

What are the benefits of NAS?

Data availability increases with NAS because it is specifically designed to intelligently store and serve files to multiple clients. Unlike basic storage devices such as USB, Firewire or CD's/DVD's, which have limited functionality, NAS includes an embedded Operating System. The OS gives NAS built-in intelligence and allows it to operate independently of the servers and clients on the network. If any of the other machines go down, the data remains secure and accessible. Additionally, NAS can include RAID, which replicates the data as it is stored across multiple disks to provide easier data recovery in the face of hardware failure.

What is RAID?

RAID (Redundant Array of Independent Disks) arrays allow multiple individual hard disks to be combined to perform as if they were one larger disk. The effect is to spread and replicate the data across the multiple disks (redundancy). That, in turn, reduces the risk of losing data if one drive fails. In short, RAID combines the capacity of multiple, independent hard drives into one while providing protection against data loss.

What is the easiest way to get RAID?

Many NAS devices use RAID technology to provide a large amount of storage with a level of fault-tolerance through redundancy. Although RAID in the past was reserved for enterprise companies, gone are the days when RAID comes at a high cost and requires IT specialists to manage it. RAID is now available in affordable solutions made specifically for home office and small business.

ReadyNAS NV+ 1TB Gigabit Desktop Network Storage - 4 Disks

NETGEAR
PROSAFE

The automated RAID expansion is made possible by our patent pending X-RAID technology while hot swap support allows you to replace a disk without powering down the system. Leading performance is assured with our custom network storage microprocessor and a Gigabit Ethernet network port. ReadyNAS couples out of the box deployment and easy management with robust file serving and data redundancy.

- 4 x 250GB hot-swap SATA HDD, swap out drives on the fly without powering down
- Hardware accelerated RAID (0,1,5 and X-RAID™) for better file transfer performance
- Bundled 5-Client EMC® Retrospect® backup and recovery software for Windows and Macintosh

BEST IN CLASS NETWORK STORAGE
SEE A WORKING DEMO IN STORE
NOW WITH 5 YEARS WARRANTY



\$1999 | U8794 | RENT \$22.41/wk*

1TB Gigabit Desktop NAS - 2 Disks \$1999 | U8816 | RENT \$22.41/wk*

2TB Gigabit Desktop NAS | \$2999 | U8817 | RENT \$31.90/wk*

4-Bay Gigabit Desktop NAS (No Disk) | \$1699 | V1246 | RENT \$19.05/wk*

DNS-323 2-Bay Network Storage Enclosure

D-Link
Building Networks for People

- Secure and share your digital files
- Insert either one or two internal 3.5" SATA hard drives without any tools or attaching any cables
- Access stored files over the web
- Protect your important files by making regular backups to mirrored hard drives using RAID 1 technology



\$389 | U4955

Hard drive(s) not included. RAID 1 mirroring requires the use of two internal SATA drives.

ReadyNAS 1100 2TB Dual Gigabit Rackmount Network Storage

NETGEAR
PROSAFE

- Patent Pending X-RAID™ Technology auto scales from 1 to 4 HDD with redundancy
- Hot-Swappable HDD design minimizes downtime (swap our drives on the fly)
- Complete RAID 0, 1, 5, X-RAID support
- Works with Windows, Macintosh, and Linux clients
- 5 Client EMC Retrospect Professional Backup software included



NOW WITH 5 YEARS WARRANTY

\$3999 | U8795 | RENT \$40.84/wk*
3TB | \$5999 | U8818 | RENT \$58.35/wk*

TeraStation Pro™ II NAS 1TB Business Server Edition

BUFFALO

- Ultra-fast data transfer rates of up to 35MB/s - more than twice the speed from TeraStation PRO
- Distributed File System support- allows multiple TeraStation to work seamlessly together as one unit
- RAID-10 provides the performance benefits of striping with redundancy of mirroring. It is ideal for multi-user and server systems



\$1199 | U5985 | RENT \$13.87/wk*
2TB | \$1999 | U5986 | RENT \$22.41/wk*

NAS200 Network Storage System with 2 HDD Bays

LINKSYS
A Division of Cisco Systems, Inc.

- Ethernet-connected network appliance with two available SATA hard drive bays adds shared storage directly to your network
- Add even more storage with two USB 2.0 ports for hard drive or flash-based USB storage devices
- Share music, video, or data files, locally and through the Internet (HTTP and FTP)
- Built-in disk utilities - backup, self test, and scandisk



\$249 | V0668

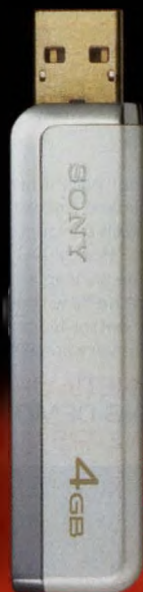
4GB Micro Vault Turbo USB 2.0

- Fast data transfer speed - up to 28MB/sec read speed and 18MB/sec write speed
- USB 2.0 hi-speed interface
- Pre-installed Micro Vault Virtual Expander software, this unique data compression software compresses data seamlessly, as you transfer files from your PC
- Plug and Play
- Classy and luxurious design
- Mobility - light and compact

NEW

\$99⁹⁵ | V2708

Also available:
2GB | \$49⁹⁵ | V2707



8GB Micro Vault Classic USB 2.0

- Plug & Play
- Virtual Expander
- Stylish and compact design
- Mobility - light and compact
- PC-Mac Compatibility
- High speed

NEW

\$155 | V2709

Also available:
4GB | \$79⁹⁹ | V2717



Limited Edition Ducati 4GB Extreme USB Flash Drive

- Ducati Edition USB flash drive
- Fast 20MB/sec sequential read/write speeds
- Extended temperature tested: -25°C-85°C

SanDisk

Cruzer Contour ReadyBoost 8GB USB FlashDrive

- Innovative sliding USB connector that retracts into the body
- Supports U3 - Turning any PC yours anywhere you go
- U3 Smart enabled. Carry and launch your personal applications and settings on any PC
- Lifetime limited warranty

SanDisk

8GB Cruiser Micro U3 USB Drive

- U3 smart™ technology gives you the ability to carry your files and your software on a secure USB drive
- Includes Skype™. Make voice and video calls from PC to PC anywhere in the world
- Retractable USB port
- "Enhanced for ReadyBoost" if using with Windows Vista

SanDisk

NEW

\$175 | V2314



\$199 | U8758

Also available:
4GB | \$119 | U8756



NEW

\$155 | V2315

Also available:
Cruzer Micro U3 4GB | \$74.95 | U8760



8GB Pocket Disk USB 2.0

- Slim design
- Lightweight and compact
- Low cost data storage
- Large 8GB capacity
- Provides security zone software



Cruzer Titanium U3 4GB ReadyBoost

- Rugged Liquidmetal® crush resistant casing 1000kg
- Enhanced for ReadyBoost™ if using Microsoft Windows Vista
- U3 smart™ technology gives you the ability to carry your files and your software on a secure USB drive

SanDisk



HOT PRICE

\$129 | U7845

Also available:
16GB | \$279 | U8965



\$84⁹⁵ | U8762

Also available:
2GB | \$48.95 | U8761

HOT PRICE

2GB miniSD Card



\$38⁹⁵ | T6172

High Capacity 4GB SD Card & Reader



\$79⁹⁵ | U6287

2GB Micro SD Card



\$39⁹⁹ | U3749

Ultra II 2GB Secure Digital Card



\$46⁹⁹ | R3304

*For terms and conditions see page 47.

300GB MiniStation TurboUSB Portable Hard Drive

BUFFALO

- High-speed 5,400rpm HDD
- Easy setup - no need to install drivers
- Supports USB 2.0
- Memeo™ auto backup software included
- Secure lock ware software to protect your data

\$399 | V2141

Also available:

80GB | \$99 | V2138
160GB | \$199 | V2139
250GB | \$279 | V2140

**80GB
ONLY
\$99**
V2138



NEW

**ONLY
@ HT**

Passport Portable Hard Drive

WD Western Digital

- Hi-Speed USB 2.0
- 5400RPM - 8MB buffer
- Plug & play, inbuilt software loads directly from the drive
- Ultra-portable drive
- Powered by USB bus so no separate power supply needed
- Now available in metallic red, white and black

250GB \$279 WHITE | V0969
BLACK | U9546
RED | V1049

160GB \$179 WHITE | V1047
BLACK | U5600
RED | V1048

NEW



250GB Mobile Disk Drive USB 2.0

LACIE

- Hi-Speed USB 2.0 interface
- Powered by USB bus - no adapter needed
- Driver-free - no software to configure
- Plug and play - preformatted for immediate use
- Stylish black

NEW

\$279 | V1601

Also available:

160GB | \$179 | V1555



These portable devices are the ideal companion to any mobile notebook. Great storage and backup solution.

Ronnie Gill, Indooroopilly Store Manager



2TB BigDisk Gigabit Ethernet Mini



- Gigabit Ethernet and USB 2.0 interface
- Expandable capacity through a USB host port
- Users and share level permissions
- Jumbo frame support

The LaCie Ethernet Big Disk is the essential storage solution for home and small business networking.

- Share files between Windows, Mac and Linux computers
- Use as a shared central repository via Gigabit Ethernet or as a personal hard drive off-network via USB.
- Second USB port to expand capacity over the network



\$1499 | V2125 | RENT \$16.81/wk*

4TB Biggest Quadra



- Powerful data storage protection, massive 4TB (terabyte) capacity
- Universal compatibility, FireWire 800, FireWire 400, USB 2.0 and eSATA interfaces
- 4 lockable, removable hard disks in drawers
- Supports RAID levels 0, 0+1, 5 and 5+hot spare
- Automatic rebuilding (RAID 0+1, 5 and 5+spare)
- Requires no driver
- EMC Retrospect software
- Event notification through audible alarm
- LCD panel for operation status display



\$3949 | V0857 | RENT \$40.32/wk*



External Hard Drives

1TB d2 BigDisk Extreme Hard Drive

- FireWire 800, FireWire 400, Hi-Speed USB 2.0
- Triple interface for universal connectivity on PC/Mac
- Built-in RAID 0 for Extreme FireWire 800 speed
- Shortcut Button: launch any application in 1 push

\$549 | V0700

My Book Premium II 2TB



- RAID mirroring for extra data protection
- RAID striping for extraordinary capacity and performance
- Extraordinary capacity
- Small footprint design
- Triple interface
- WD Backup Software
- Intelligent drive management features



\$999 | V1164 | RENT \$11.56/wk*

Also available: 1.5TB | \$799 | U9766 | RENT \$9.24/wk*

My Book Premium 500GB External Drive



- Easy set up and installation - just plug in and use
- Dual interface for high speed performance
- Intelligent drive management features, auto power on and off with your PC
- Safe Shutdown prevents this drive from being powered down until all your data has been written



SAVE \$30

\$249 | U0069

My Book Essentials 500GB External Hard Drive



- High-speed USB 2.0 data transfer
- Easy to set up, easy to use
- Simple add-on storage for your files, music, photos and movies
- Google Search Tool Note: Google software is compatible with Windows 2000 and XP only.



\$229 | T9002

*For terms and conditions, including RentSmart, see page 47

LACIE

500GB d2 Quadra Hard Drive

- Gigabit Ethernet and USB 2.0 interface
- Quick and easy IP configuration
- Expandable capacity through a USB host port
- Users 7 share level permissions
- Jumbo Frame support

1TB Gigabit Ethernet Mini External Hard Drive

- Gigabit Ethernet and USB 2.0 interface
- Expandable capacity through a USB host port
- User and share level permissions
- Stream your photos, music and videos
- Full support for Windows, Mac and Linux
- Simple set-up with a quick Wizard Install

SAVE
\$100

\$349 | U5722

\$499 | U5309

Also available:
500GB | \$399 | U4961

My Book World II Edition 1TB

WD Western Digital

- Unique remote-access storage system for wired or wireless networks
- Access and share data securely, in the office or anywhere in the world - even when your local computer is off
- Gigabit Ethernet connectivity
- RAID 1 mirroring for data recovery
- NAS Server



SAVE
\$30

\$569 | U9550 | RENT \$6.58/wk*

1TB Shared Storage II External Hard Drive Maxtor

- Automated back up for photos, music, video and data on networked PCs and Macs to one location
- Automatic mirroring of 500GB data
- Access files from multiple PCs and Macs simultaneously
- Easy installation with automatic network configuration



SAVE
\$80

\$669 | T9385 | RENT \$7.74/WK*

FreeAgent 500GB Desktop Drive

Seagate

- Footprint is no bigger than a stapler
- 5 year limited warranty
- Just plug it in and you're ready to go
- USB 2.0 interface
- PC and Mac compatible



HOT
PRICE

\$229 | U6876

500GB Desktop Hard Drive USB 2.0

LACIE

- Hi-speed USB 2.0 Interface
- Play & Plug
- Advanced Natural heat dissipation
- LaCie 1-Click back-up software
- Drive free for Windows 2000, XP, Vista and Mac OS X

NEW



\$199 | V2302

Don't let identify theft get you!



P-45C Confetti Cut Shredder

- Designed for home office or occasional use
- Duty Cycle is 5 minutes on and 10 minutes off
- Sheet Capacity - 6 sheets
- Confetti Cut, with a shred size of 3.9 x 50mm
- Shred staples and credit cards

\$129 | V0569



DS1 Cross Cut Shredder with Safe Sense

- Shreds up to 11 sheets
- Safe sense technology - immediately stops shredding when touched
- Confetti cut particles for extra security
- Also shreds credit cards, staples and small paper clips
- Auto start/stop feature ensures quick, easy shredder operation

\$249 | V0533

Microshred High Security Shredder MS450Cs

- Shreds your paper into pieces smaller than the length of a staple
- Shreds CDs, credit cards, staples and paper clips
- Cut type: microshred
- Shred size: 2mm x 8mm
- Sheet capacity: 7
- Designed for moderate use



\$369 | V0537



Verbatim

Lifestyle Reward for Everyone

Purchase any 50 pack or 100 pack of CDs or DVDs or a 30 pack of LightScribe to receive a bonus lifestyle reward!



CD-R 52x Inkjet Printable White 50Pk

\$19⁹⁵ | T7011



DVD-R 16x InkJet Printable White 50Pk

\$29⁹⁵ | T4157



DVD-R 16x LightScribe 30Pk

\$29⁹⁵ | U4742



DVD-R 16x Inkjet Printable White 100Pk

\$64⁹⁵ | T8952

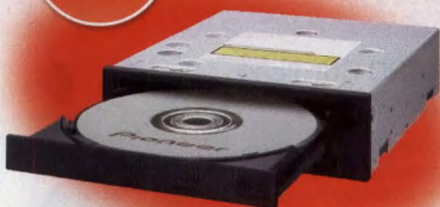
To claim your Verbatim Lifestyle Voucher, simply retain the receipt from your purchase of any of the above. Send your receipt PLUS an Entry Form PLUS a business size stamped self-addressed envelope to: Verbatim Lifestyle Rewards, PO Box 657, North Sydney NSW 2060, Australia, to be received within 28 days of purchase. You will receive your Verbatim Lifestyle Voucher within 28 days of receipt of claim. Available from 01/11/07 to 30/11/07. Visit verbatim.ht.com.au for full details.

*For terms and conditions, see page 47.

Internal Optical Drives

Pioneer**DVR-212D
OEM SATA DVD Writer**

- Multi format DVD writer with SATA interface
- 18x write speeds on both DVD-R/+R media
- 10x burning on Dual/Double Layer media
- Write 4.7GB of data to write-once media or store up to 8.5GB on Double Layer media

**HOT
PRICE****\$69** | U6156**Pioneer****DVR-A12XLA
Multi-format DVD/CD Writer**

The Pioneer DVR-A12XL series drive boasts scintillating 18x write speeds on both DVD-R/+R media, and 10x burning on Dual/Double Layer media.

**\$79** BLACK | U5638
BEIGE | U6202
SILVER | U5639**SONY.****DRU840A Internal Dual
Layer 20x DVD Burner IDE**

- High speed 20x DVD burning
- Multi format support
- Supplied with Nero 7 software
- Windows Vista ready
- Interchangeable faceplate

NEW**\$99** | V2154**Disc Stakka C10****Imation**

Never waste valuable time searching for discs again. The Imation Disc Stakka is an automated carousel that stores, protects and retrieves all of your discs, making lost or damaged discs a thing of the past. Each Disc Stakka unit holds 100 discs and you can stack units up to 5 high to create a tower that holds up to 500 discs.

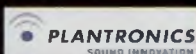
**SAVE
\$20****\$169** | M4871**DRXS70U Ultra-Slim
External USB DVD
Burner****SONY.**

- Multi format support
- Stylish slim design
- Extensive Windows software suite
- USB interface easy plug and play install
- Windows Vista ready and Mac compatible
- New robust aluminium casing
- Ultra-light 440g

**\$199** | V0571**d2 DL SuperDrive
LightScribe 20x
DVD±R/RW****LACIE**

- USB 2.0 and Firewire interface
- Create and record your own music, movie and photo CD/DVDs
- LightScribe: design and etch custom, professional labels
- Optimum performance with fast 18x write speed
- Record to DVD±R DL, DVD±R/RW and CD-R/RW

NEW**\$189** | V1814



.Audio DSP-400 USB Folding Stereo PC Headset

- Foldable headband for easy storage
- Full range stereo sound delivering excellent digital sound quality
- Noise canceling, telescoping microphone

\$79 | V0869

PRICE DROP

.Audio 910 Portable Bluetooth Headset

- Answer and end calls remotely via the headset
- Noise-canceling microphone for clearer conversations
- Up to 6 hours talk time and 100 hours standby

\$149 | V0868

Voyager 510SL Headset System

- The Voyager 510S Bluetooth Headset System allows you to seamlessly switch between your office phone and Bluetooth mobile phone
- The HL10 handset lifter fits on your telephone, letting you answer calls with the touch of a button

SAVE \$30

\$249 | T2548

Cordless Desktop Wave

- High-performance cordless laser mouse
- Wave-shaped contour of the keys comfortably cradles your fingers
- Cushioned palm rest provides extra support
- State-of-the-art laser mouse delivers exceptional precision and control



Bluetooth Laser Cordless Desktop MX5000

- The smart desktop that combines an LCD keyboard display, high-speed Bluetooth wireless hub with SecureConnect technology
- Comes with innovative touch-sensitive media controls



SAVE \$20

\$179 | V0698

\$225 | T3579

V470 Bluetooth Laser Mouse

- Connects directly to Bluetooth-enabled notebooks
- Laser technology delivers smoother tracking
- Low-battery indicator and an on/off switch extends battery life
- Side-to-side scrolling plus zoom
- Protective travel pouch included



NEW

MX620 Cordless Laser Mouse

- Precision laser tracking
- Ergonomic design with soft rubber grips
- 2.4GHz digital cordless technology for strong connections and no interference
- Micro-receiver stores neatly inside mouse



\$79⁹⁵ | V1818

\$99⁹⁵ | U9769

QuickCam Ultra Vision

- Precision-engineered lens for superior image quality
- Clear and echo-free audio
- Personalised video conversations
- Quick video preview button to see yourself before a call



NEW

Cordless 2.4GHz Presenter

- Easy-set LCD timer gives automatic, inaudible warnings
- Extended 50-foot range
- Battery life of up to six months
- Convenient on/off switch



\$199 | U9772

\$99 | S8331

*For terms and conditions see page 47. CashBack available between 01/09/07 and 31/01/08. Redeem your CashBack to value of 25% off the recommended retail price. Claims must be received by 5pm on 29/02/08. Please allow 60 days from the time a claim has been received by Microsoft® for delivery. Offer not valid in conjunction with any other offer. For any queries please call 1800 233 033 or visit www.microsoft.com.au/hardware/offers for more details.

diNovo Edge Bluetooth Keyboard

- Stylishly sleek design with stand, ideal for office or home
- Advanced Li-Ion batteries charge more quickly and last longer
- Bluetooth wireless technology
- Revolutionary TouchDisc with hyper-fast scrolling
- Windows Vista compatible



**SAVE
\$30**

diNovo Media Bluetooth Laser Desktop

- Bluetooth MediaPad — long range Bluetooth remote commander
- Combines a numeric pad, calculator and remote control



**SAVE
\$30**



\$299 | U5116

\$299 | T3582

V450 Laser Cordless Mouse for Notebooks

- Precision laser tracking
- Ergonomic design with soft rubber grips
- 2.4GHz digital cordless technology for strong connections and no interference
- Micro-receiver stores neatly inside mouse



**HOT
PRICE**

MX Revolution

- Logitech SmartShift™ Technology
- Revolutionary hyper-fast scroll wheel
- Rechargeable Li-Ion battery
- Precision laser tracking
- PC and MAC compatible
- Hyper-fast scrolling
- Document quick-flip
- Touch to search



**HOT
PRICE**

\$79⁹⁵ | U0117

\$129 | T9986

LifeCam VX-6000

- High Definition video (1.3 megapixels) and photos (5.0 megapixels interpolated)
- Wide-angle lens 3 times digital zoom
- Automatic face tracking software



**\$35
CASHBACK¹**

\$64 | T9680

BEFORE CASHBACK YOU PAY \$99

Wireless Notebook Presenter Mouse 8000

- Smoothly navigate through Microsoft Office, PowerPoint and other presentations from up to 9m away
- Use Media Remote for multimedia presentations and control digital entertainment
- Digital Ink gives presentations more impact by highlighting vital information on screen



Microsoft

**\$40
CASHBACK¹**

\$89 | U4249

BEFORE CASHBACK YOU PAY \$129

ONLINE
10% OFF ALL
MICROSOFT
BOXED SOFTWARE
ONLY*

Microsoft

Windows Vista Home Premium

- Collaborate and share documents with Windows Meeting Space
- Experience photos and entertainment in your living room with Windows Media Center
- Enjoy Windows Media Center throughout your home with Media Center Extenders
- Easier networking connectivity - Stay connected wherever and whenever you like with Network and Sharing Center

\$455 | FULL | U4500

\$299 | UPGRADE | U4501 **\$179¹** | UPGRADE ACADEMIC | U4502



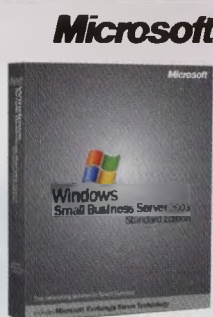
Windows Small Business Server 2003

- Protected, reliable operating system with easy-to-use network tools and security
- File, print and application sharing
- Robust firewall for improved security and data protection
- Streamlined, professional email and messaging

\$1008 | R2 + 5 CALs | T7549

\$815 | 5 ADDITIONAL USER CALs | L3113

\$815 | 5 ADDITIONAL DEVICE CALs | L3111



Microsoft

Office Project Standard 2007

- Effectively manage and understand project schedules
- Build schedules, allocate resources, and manage budgets
- Build professional charts and diagrams.

\$999 | FULL | U4487

\$599 | UPGRADE | U4488

\$110¹ | ACADEMIC | U4486



Office

Office Small Business 2007

Microsoft Office Small Business 2007 saves time, allows you to stay organised and focus efforts on sales, marketing and customers.

Includes: Word 2007, Excel 2007, PowerPoint 2007, Outlook 2007 with BCM, Publisher 2007.

\$749 | FULL | U1827

\$499 | UPGRADE | U1828



Office Home and Student 2007

Microsoft Office Home and Student 2007 is the essential office software for home computer users.

Includes: Word 2007, Excel 2007, PowerPoint 2007 & OneNote 2007

\$229⁴ | U1823



Office Mac 2004 Student Teacher Edition

Office 2004 for Mac introduces features designed to help you transform the way you manage information and share your ideas. Includes Word 2004, Excel 2004, PowerPoint 2004, Entourage 2004.

\$249² | N6773

BONUS UPGRADE GUARANTEE TO OFFICE 2008 FOR MAC³



Office

Take advantage of this month's Online Only offer and receive 10% off all Microsoft boxed software in November. Order online today to get these savings.

Simon Mills - Order Fulfillment Officer, North Ryde

ONLINE
10% OFF ALL
MICROSOFT
BOXED SOFTWARE
ONLY*

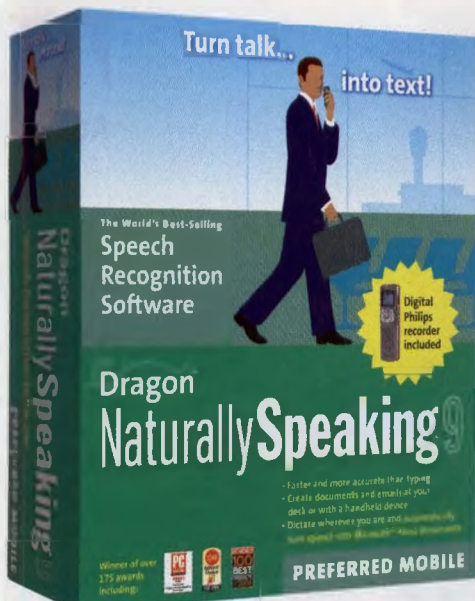
Dragon Naturally Speaking Mobile 9.0 Includes Phillips Digital Voice Recorder

Dragon NaturallySpeaking Preferred 9 gives small business users and PC enthusiasts the power to create documents, reports, emails and more - all by speaking! Just use your voice to dictate and edit in Microsoft Word and Excel, Corel WordPerfect, and virtually all Windows-based applications.



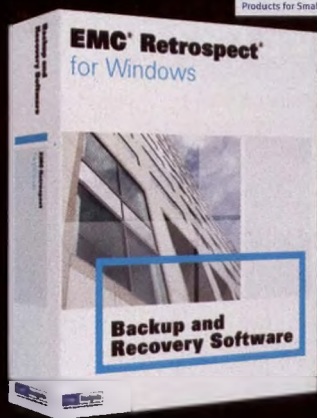
**\$75
CASHBACK⁵**

\$500 | T9234 | YOU PAY \$575 BEFORE CASHBACK

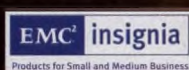


EMC Retrospect Professional 7.5

EMC Retrospect is automated, reliable, cost-effective backup and recovery software for small and medium business (SMBs), the distributed enterprise, and home offices. Retrospect protects millions of computers worldwide.

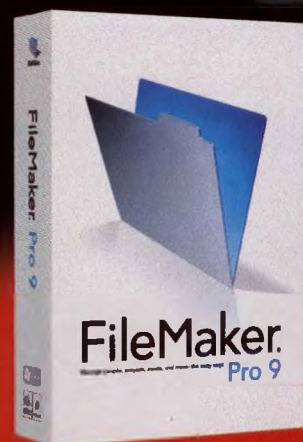


\$169 | T5156



FileMaker Pro 9.0

- Create a database in minutes to track people, projects, assets and more
- Customise screens with ease
- Share databases securely and simultaneously over a network or across the Web
- Integrate with popular programs and formats including Microsoft Excel, Adobe PDF and External SQL Data Sources



\$489 | U9549

FileMaker.

OmniPage 16

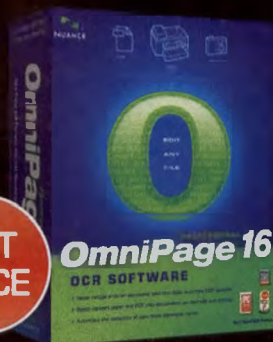
- Faster, more accurate OCR
- Improved formatting, tables and more
- Capture text with a digital camera



\$99 | V2134

OmniPage 16 Professional Upgrade

- Upgrade from OmniPage Pro 14 and 15
- Get better organized with PaperPort (included)
- Capture text with a digital camera
- Automated data collection from forms
- Redact (black-out), highlight and strikethrough text



\$149 | V2703

Acrobat 8.0 Standard

- Easily create Adobe PDF documents
- Scan to PDF with OCR
- Convert email to Adobe PDF files
- Save in Microsoft Word
- Capture web pages



\$469 | U1222

*For terms and conditions, including Online Only, see page 47. ¹Must be a qualified Education user to purchase this product. For eligibility criteria please visit <http://www.microsoft.com/australia/education/howtobuy/eligibility/studentsandteachers.aspx>. ²Must be a qualified Education user to purchase this product. For eligibility criteria please visit www.microsoft.com/australia/office/mac/student.aspx#2. ³Purchase eligible genuine retail editions of Microsoft Office 2004 for MAC between 26/09/07 and 29/02/08 and be eligible to upgrade to the new Microsoft Office 2008 for MAC for \$27.00 including GST [postage and handling] via redemption from Microsoft. \$27.00 excluded from Online Only discount. Internet access and payment by credit or debit card required for redemption. ⁴Office Home and Student is for non-commercial use only. ⁵Purchase full versions of Dragon Naturally Speaking v9 Mobile and Dragon Naturally Speaking v9 Wireless between 1/10/07 and 31/01/08 be eligible to receive \$75 cashback. See nuance.ht.com.au for full terms and conditions. Postage charges may apply.

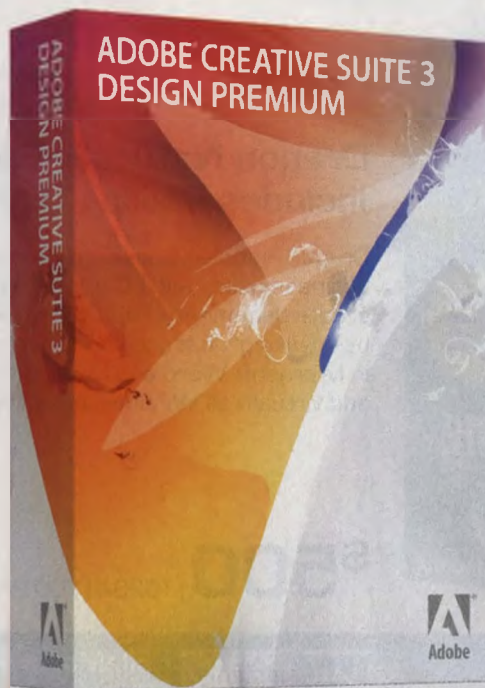
CS3 Design Premium

Adobe Creative Suite 3 Design Premium software is the designer's dream toolkit for print, web, interactive and mobile publishing. It combines all-new versions of essential tools for professional page layout, image editing, illustration, and Adobe PDF workflows with new tools for designing engaging websites, interactive experiences, and mobile content.

\$2899 | FULL | U6349

\$949 | UPGRADE | U6385

\$879 | ACADEMIC¹ | U6316



Includes:

- InDesign CS3
- Photoshop CS3 Extended
- Illustrator CS3
- Flash CS3 Professional
- Dreamweaver CS3
- Acrobat 8 Professional
- Adobe Bridge CS3
- Version Cue CS3
- Adobe Device Central CS3
- Adobe Stock Photos Acrobat

Corel Paint Shop Pro Photo X2

New Corel Paint Shop Pro Photo X2 is the ideal choice for any aspiring photographer's digital darkroom.

- Process photos like the pros
- Edit easily using unique tools
- Enhance photos with powerful, easy-to-use tools

\$199 | FULL | V1833

\$159 | UPGRADE | V1834



COREL

Photoshop CS3 Extended

Photoshop Extended version delivers everything in Photoshop CS3.

Plus

- 3D and motion support
- Comprehensive image analysis

\$1649 | FULL | U6428

\$599 | UPGRADE | U6427

\$469 | ACADEMIC¹ | U6430



Adobe

Ulead Video Studio 11 Plus

Ulead VideoStudio 11 Plus is video editing and DVD authoring software that combines powerful features and ease of use. Produce professional-looking videos, slideshows and DVDs, in standard or new High-Definition formats.

**SAVE
\$20**

\$179 | U8344



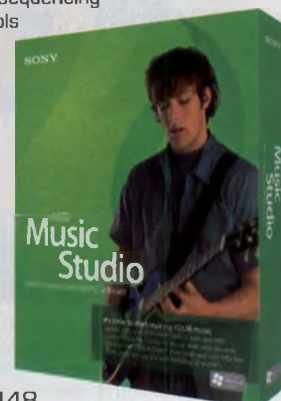
ULEAD
CREATIVE INTELLIGENCE

ACID Music Studio 7

SONY

- Multitrack audio and MIDI recording
- Includes over 3,000 ACIDized loops and 1,000 MIDI files
- MIDI editing and sequencing
- Studio-quality tools
- Built-in CD burning
- Show Me How tutorials

\$159 | U9448



*For terms and conditions see page 47. ¹Must be a qualified Education user to purchase this product. For eligibility criteria please visit www.adobe.com/education/

Vegas Movie Studio Platinum 8

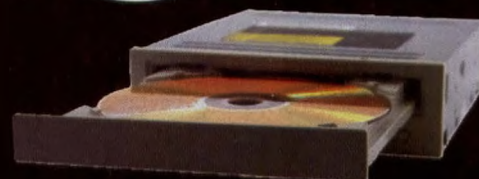
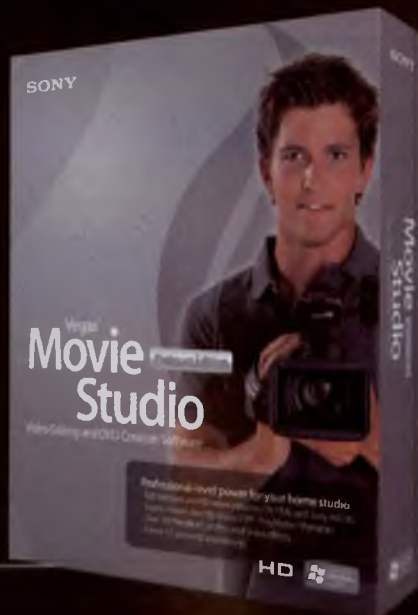
Ideal for producing high-quality movies, corporate videos, wedding DVDs, and more.

- Import and edit support for HD Sony AVCHD
- 24 new DVD themes
- ATRAC editing and encoding
- Gracenote MusicID CD album recognition
- Import and edit DV, HDV, and other video formats
- 5.1 surround sound mixing and encoding
- Show Me How tutorials for interactive, step-by-step help

harristtechnology



SONY



\$219 | U9445

BONUS DVD BURNER²

Photoshop Elements 6

Do it all with one powerful yet easy-to-use product.

- Make your photos look their best with easy-to-use editing tools
- Do more with your photos in unique creations for print and web

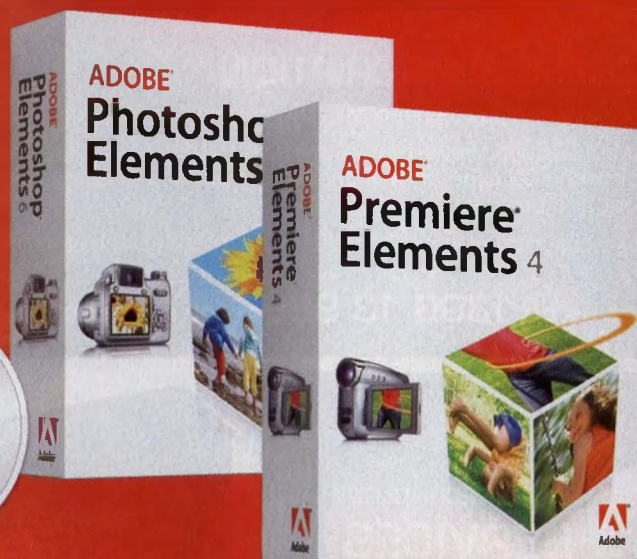
\$169 | V2388

Premiere Elements 4

Create and share great-looking movies in minutes with Adobe Premiere Elements 4 software.

- Make movies with drag-and-drop ease
- Show your style with amazing effects
- Share your movies virtually anywhere

\$169 | V2410



Adobe CS3 Web Premium

A complete solution for creating interactive websites, applications, user interfaces, presentations, mobile device content, and other digital experiences.

Includes:

- Dreamweaver CS3
- Flash CS3 Professional
- Photoshop CS3 Extended
- Illustrator CS3
- Fireworks CS3
- Acrobat 8 Professional
- Contribute CS3



\$2599 | U6357

Roxio Easy Media Creator 10 Suite

The new Roxio Easy Media Creator 10 gives you creative inspiration and all the tools you need to enhance your digital lifestyle.

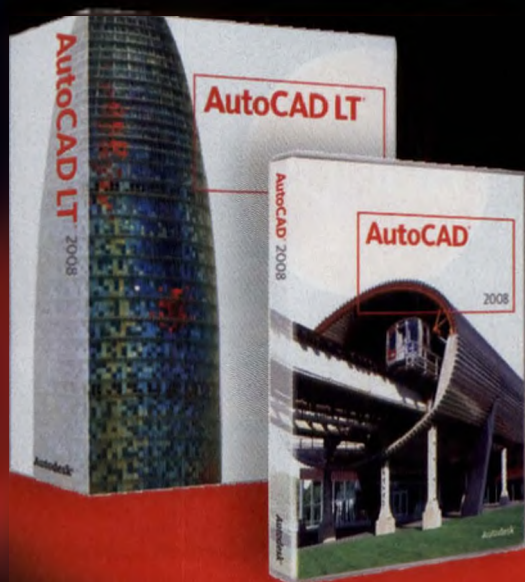
- Convert audio and video files to the format of your choice right on your Windows Vista desktop.
- Create dazzling slideshows with music in standard or high definition
- Save tons of time by ripping CDs from multiple drives.



roxio

\$179 | V1842

[purchasing/qualify.html](#) ²Purchase Vegas Movie Studio Platinum 8 between 01/11/07 and 30/12/07 and be eligible to redeem a bonus DVD burner. See [newmagic.ht.com.au](#) for full terms and conditions.



AutoCAD LT 2008

Streamline your day-to-day tasks with AutoCAD LT® 2008 software, the world's number-one-selling 2D drafting and detailing product, built with the drafter in mind.

\$2199 | U5972

AutoCAD 2008

Make efficiency a daily part of the job with AutoCAD® 2008 software. Meticulously refined with the drafter in mind, AutoCAD 2008 propels day-to-day drafting forward with features that increase speed and accuracy while saving time.

\$7040 | U5973

AUTODESK SUBSCRIPTION

Get up to date and up to speed with the complete software, support, and training package from Autodesk Subscription.

With Autodesk Subscription you receive the latest Autodesk software releases, product enhancements, web support from Autodesk technical experts, self-paced online training to improve your design skills, and a broad range of other exclusive technology and business benefits.

Autodesk Subscription is available for a single annual fee with the purchase of your AutoCAD 2008 or AutoCAD LT 2008 software.

Contact us on **1300 13 9999** for more details.

Note: Terms and conditions apply

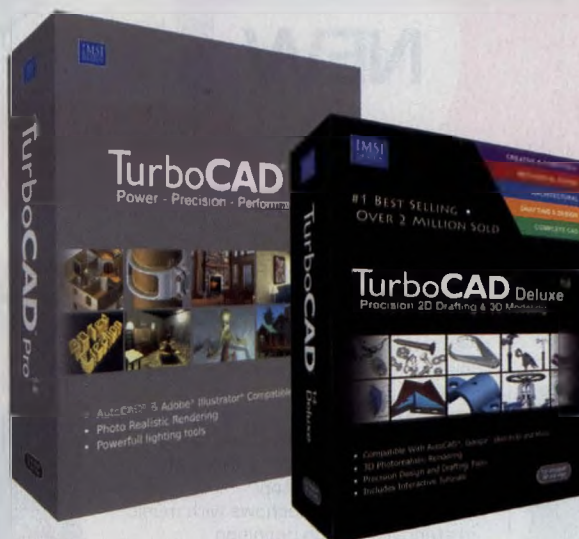


**HARRIS TECHNOLOGY
SERVICES**

HEALTH CHECK SERVICE

- Assessment of back-up procedures
- Assessment of security through regular update and correct installation of AntiSpam, AntiSpyware, Antivirus software on servers, workstations and email gateway
- Check Firewall for Internet connection and presence of content filtering software for Internet and email
- Server check event log for re-occurring problems, memory usage, hard drive free space, UPS backup for server
- Network check, i.e. cable patching and network switches, secured wireless access point (if in use)

Site visit | **\$280¹**



**MSI
DESIGN**

TurboCAD Deluxe 14

TurboCAD Deluxe 14 is an all-purpose CAD program for all projects at home and at the office. Create precision 2D drawings, intricate 3D models, and utilise powerful photorealistic rendering tools to accurately visualise and present your ideas. Includes millions of symbols and 200+ 2D training lessons.

**INCLUDES 2D TRAINING
CD VALUED AT \$79⁹⁵**

\$189 | U9413

TurboCAD Professional 14 Non Commercial

TurboCAD Pro 14 is a precision design solution that delivers unparalleled design productivity and dramatic visual results with integrated 2D drafting, 3D surface and solid modelling using the powerful ACIS solid modelling engine, and 3D photorealistic rendering. TurboCAD Pro is the most advanced CAD software in its price range.

\$279 | U9411

*For terms and conditions see page 47. ¹Charges applicable to Metropolitan locations only within 50km from General Post Office. For areas outside a 50km radius, additional charges apply.



Quicken Personal 2008

Quicken Personal is for those individuals who want to "actively participate" in the management of their personal finances.

- Track all your bank accounts, credit cards, income and expenses
- Great tax features that will make tax time less painful
- Budgeting tools to help you save and plan for your future

Quicken Personal Plus 2008

Quicken

All the functions of Quicken Personal, plus exclusive tools to help you manage your investments and maximise tax-saving opportunities.

- Monitor all of your personal and business investments
- Use the ASIC FIDO Superannuation Calculator



BONUS

\$95 | V2650

\$189 | V2647

● BONUS \$50 iTUNES GIFTCARD*

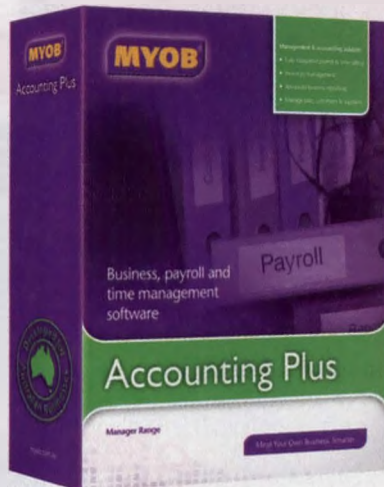
Accounting Plus 17

MYOB Accounting Plus, professional business management software helps you manage your business and payroll with ease.

- Bill for your time the way you want to
- Manage all your banking requirements
- Automate your payroll

SAVE
\$100

\$495 | V1232



MYOB

QuickBooks Accounting 2007/08

Quicken

An effective software package specifically tailored for small businesses that don't need payroll or stock tracking, but do need to track more than money in and money out.

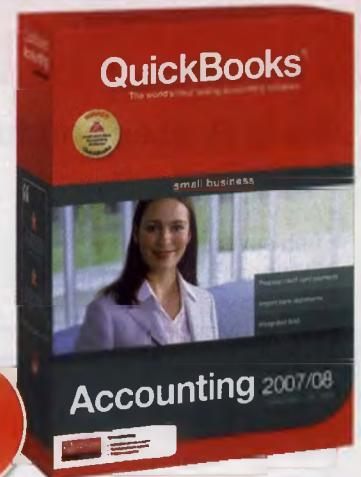
- Process credit card payments
- Import bank statements
- Track GST & BAS
- Compatible with Microsoft Windows 2000/XP/Vista™
- 12 months free* technical phone support
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Best Accounting Software

\$275 | U5975

SAVE
\$24



*See pack for details

RetailReady via Redemption

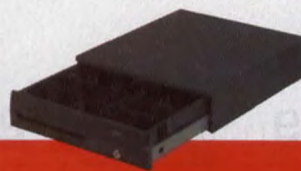
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Ideal if you:

- Are starting a retail business or are tired of using a cash register
- Have your own PC
- Want to create a professional look for your business

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- High resolution Posiflex PP 7000 Thermal Docket printer
- Posiflex CR 3100 Electronic cash drawer



HOT
PRICE

\$899 | T0603



MYOB

*Purchase a full version of Quicken Personal Plus 2008 or Quicken Home & Business 2008 between 01/11/2007 and 29/02/2008 and be eligible to receive a \$50 iTunes voucher via redemption from Quicken. See quicken.ht.com.au for full terms and conditions.



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Client/Server/Messaging Security 3.6 for SMB

Trend Micro Client/Server/Messaging Security for Small and Medium Business protects your Microsoft Exchange servers, Windows servers, networked desktop computers and laptops from spam, viruses, phishing and hackers, while providing additional security through a personal firewall. Its single point of management, automated threat management and intuitive interface ensures worry-free installation, minimal configuration, and zero administration.

\$600 | 5 NODE | V1032 | \$120 PER EXTRA NODE UP TO 9

\$841¹⁰ | 10 NODE | V1037 | \$84¹¹ PER EXTRA NODE UP TO 24

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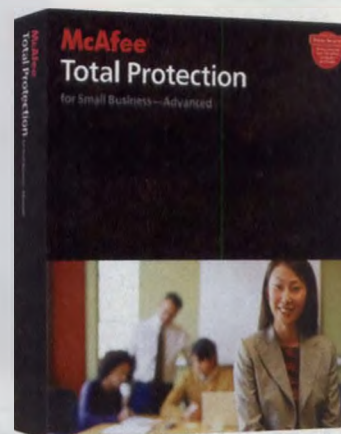
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Enhanced Desktop Security :

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McAfee



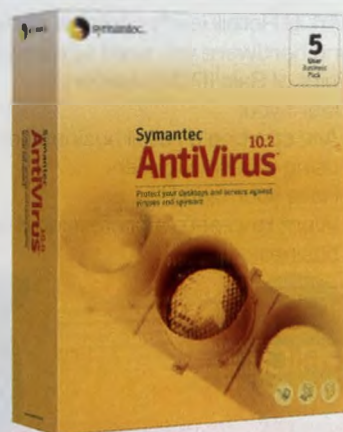
\$399 | 5 USER | U0716 **\$799** | 10 USER | U0717 **\$1799** | 25 USER | U0712



Symantec AntiVirus 10.2 with Groupware Protection

Symantec AntiVirus with Groupware Protection Business Packs protect your network against viruses, spyware, and spam. Centralised controls and automatic protection updates help you defend against both known and emerging threats. Symantec AntiVirus with Groupware Protection now automatically detects and removes spyware and adware on desktops and file servers. It also removes viruses from POP3 email messages, attachments, and other incoming files. And it blocks spam on your Microsoft Exchange or Lotus Domino email server.

symantec.



\$605 | 5 USER | U6822 **\$1129** | 10 USER | U6823 **\$2410** | 25 USER | U6825



¹⁰For terms and conditions, see page 47 ¹¹Purchase a full version of TrendMicro Internet Security Pro 2008 between 17/09/07 and 30/11/07 and be eligible to redeem a 1 GB MP4 player. MP4 player image is for illustration purposes only and may vary to the image advertised. See trendmicro.ht.com.au for full terms and conditions.

¹²Purchase a full version of McAfee Internet Security Suite 2008 product between 17/09/07 and 30/11/07 and be eligible to redeem a bonus Casino Royale DVD. See mcafee.ht.com.au for full terms and conditions.

Internet Security Suite 2008

McAfee

McAfee Internet Security Suite with SiteAdvisor is a proactive 10-in-1 always-updating security bundle that protects what you value with multiuser child safety, identity theft prevention, email and IM protection, and automated back-up.



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\$149 | 5 USER | V1276

BONUS CASINO ROYALE DVD²

Total Protection 2008

McAfee

McAfee Total Protection provides comprehensive, proactive 12-in-1 security that guards what you value; and, McAfee SiteAdvisor Plus actively shields your PC from interaction with dangerous websites. Continuously and automatically updating, McAfee's security service helps prevent online hacker attacks with the latest protection. Also, it features a back-up and restore capability.



NEW

\$129 | 3 USER | V1277

Internet Security Pro 2008

At home or on the go, Trend Micro Internet Security 2008 Pro safeguards your online transactions, identity and irreplaceable files with the most comprehensive protection available.

Get all the benefits of our proven Internet Security plus enhanced identity theft and transaction protection and remote security management.

BONUS

NEW

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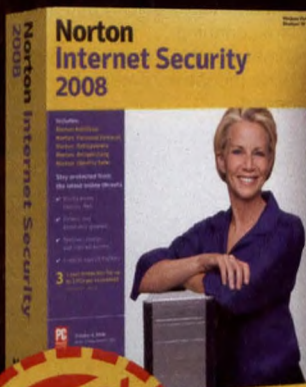
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Norton Internet Security 2008 3 PC

Stay protected from the latest online threats.

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- Personal Firewall
- Antispyware
- Identity Safe
- Antiphishing



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- ✓ Uses 76% less memory than 2006 version
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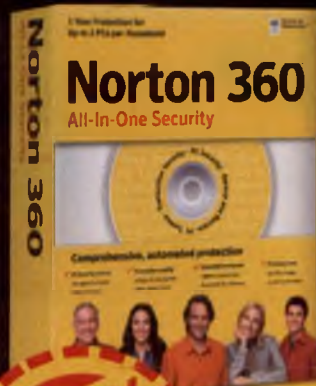
\$99 | V1385

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Norton 360 3 PC

Norton 360 offers a full circle of protection and eliminates the need to purchase and manage multiple products.

- AntiVirus
- Antispyware
- Antiphishing
- Online identity protection
- Web site authentication
- Two Way Firewall
- 2GB secure online storage



- ✓ All-in-one security, backup & tuneup for up to 3 PCs
- ✓ **\$30 BACK** for users of any security software brand!*
- ✓ Bonus 2GB secure online storage

www.takethenortonchallenge.com

\$129 | U6150

60 DAY MONEY-BACK GUARANTEE

*Terms & Conditions apply. \$30 back via mail-in redemption from Symantec, proof of previous ownership required. Ends 2/1/08. See box or website above for details.

ScanJet 5590 Digital Flatbed Scanner

- Optical scanning resolution: 2400 dpi x 2400 dpi
- Hardware scanning resolution: Up to 4800 x 9600 dpi
- Bit depth: 48 bit
- Scan and email photos and documents
- Hi-Speed USB



\$949 | N8512 | RENT \$10.98/wk*

LIDE600F Scanner



- High quality scanning at 4800x9600 dpi.
- 7 EZ buttons allowing you to quickly create a multiple-page PDF file optimised for your originals, as well as copy, scan or email images quickly and easily.
- FARE Level 3, the optimal solution for film scanning.
- Automatic dust & scratch, fading, graininess and backlight correction technology.
- Film scanning: 6 frames of 35mm filmstrip [negative/positive]
- One-plug-in startup - No power cord needed.



\$239 | U5466

Perfection V500 Photo



- ReadyScan LED technology
- 6400 x 9600dpi resolution
- Advanced Matrix CCD Micro Lens technology
- Optical density of 3.4Dmax
- Document and film scanner
- Digital Ice technology



NEW

\$469 | V2206



LIDE90 Scanner



- High quality scanning up to 2400x4800dpi high resolution and 48 bit superior gradation
- USB 2.0 Hi-Speed interface for fast data transfer
- Automatic dust and scratch, fading, graininess correction
- Backlight correction available for reflectives
- Four one-touch buttons Scan/Copy/PDF/E-mail for easy operation
- Advanced Z-Lid and scanning in the upright position

\$155 | V1811



Scanjet 4050 Photo Scanner



- Scan Resolution: 4800 x 9600 dpi
- Scan 16 slides, 30 negatives plus medium/large film format
- 96-bit colour
- Instant on / 4 button front panel [scan, scan film, copy, scan to share]
- Hardware dust and scratch removal
- Warranty: 1 year

\$499 | U5806



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CardScan Executive features a desktop card scanner and full-featured contact management software, ideal for the power user. Synchronise easily with Outlook, PDAs smart phones, plus AOL, Lotus Notes and GoldMine. Colour scanner and fast 3-second scan¹.

¹ CardScan Executive only works with single/standard user versions of these products.

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Available capacity of hard drive may be less due to preinstalled software.

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*RENTSMART

The figures quoted are based on a per week basis over 3 years. Standard rentsmart terms and conditions apply.

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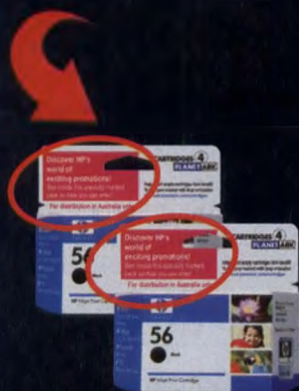
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(via redemption)

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Photo Book from
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S3494	T0596	Light Magenta	\$22.95
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hp PROMOTIONS



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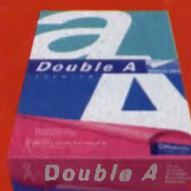
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T4776

Double A A4
2500 page box



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14779

Double A A3
500 page ream



\$18⁹⁵

T4777

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WIN EXCITING PRIZES

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ML-2010 Mono Laser



Value Printer

- Print Speed: up to 20ppm (A4)
- Print Resolution: 1200 x 600 dpi
- Memory: 8MB
- Warranty: 1 year

\$129

T0775



E120N Laser

Network Ready Printer

- Print Speed: up to 19ppm (A4)
- Resolution: up to 600 x 600 dpi
- Memory: 16MB
- Warranty: 1 year

\$179

T7001



LEXMARK

Laserjet 1022



- Print Speed: up to 18ppm
- Print Resolution: 1200 x 1200 dpi
- Total Media Capacity: 260 Sheets
- Memory: 8MB
- Connection: Hi-speed USB
- Monthly duty cycle: 8,000 pages
- Warranty: 1 year

\$299

R9103



ML-2571n



- Print Speed: up to 24ppm
- Print Resolution: 1200 x 1200 dpi
- Total Media Capacity: 250 sheets
- USB / Ethernet connection
- Monthly duty cycle: 20,000 pages
- Warranty: 2 year on-site

\$299

U0583



HL-5250DN



- Print Speed: up to 30ppm
- Print Resolution: 1200 x 1200 dpi
- Total Media Capacity: 300 Sheets
- Memory: 32MB
- Connection: USB / Ethernet
- Duplex mode for dual sided printouts
- Monthly duty cycle: 20,000 pages
- Warranty: 1 year

\$449 | T3555



Laserjet 1022N



- Print Speed: up to 18ppm - Mono (A4)
- Print Resolution: 1200 x 1200 dpi
- Total Media Capacity: 260 Sheets
- Memory: 8MB
- Connection: Hi-speed USB, Ethernet
- 10/100Base-TX
- Monthly Duty Cycle: 8000 pages
- Warranty: 1 year

\$479 | R9104



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Approx value **\$2399**

2nd HP 6710s Notebook

Approx value **\$1299**

3rd iTunes Gift Card

Value **\$300**

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Do it fast and do it well. You can improve workteam productivity with this powerful black-and-white workhorse. This attractive, compact printer produces professional-quality documents without sacrificing speed.

- Printing at the speed of business for workteam productivity
- Get this printer for the professional quality you require day in and day out
- Save hours with fast set-up, hassle-free use, and convenient supplies reordering
- Ideal for workteams of up to 10 users and demanding individuals in small, medium and enterprise companies who need a reliable, space-saving, black-and-white printer for fast, high-quality business printing.

\$699

P2015N | U4728 | RENT \$8.09/wk*

Also Available:

HP LaserJet **P2015DN** | \$799 | U6036 | RENT \$9.24/wk*

HP LaserJet **P2015X** | \$899 | U5828 | RENT \$10.40/wk*

HP LaserJet **P2015** | \$579 | U5652 | RENT \$6.70/wk*



BONUS 2 YEAR WARRANTY¹ AND TONER²

Laserjet P3005 Series

The HP LaserJet P3005 Printer series is the ideal solution for small and medium-sized offices. With its ease-of-use, low total cost of ownership and robust performance, this worry-free printer allows you to rest easy and concentrate on your business.

- Efficiency through faster print
- Productivity enhanced by connectivity
- Save time with fewer interruptions

\$1099

U4776 | RENT \$12.71/wk*

Also Available:

HP LaserJet **P3005N** | \$1429 | U5328 | RENT \$16.02/wk*

HP LaserJet **P3005DN** | \$1599 | U5330 | RENT \$17.93/wk*

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WIN EXCITING PRIZES

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**\$100
CASHBACK¹**

CLP-300N Colour Laser

WORLDS SMALLEST COLOUR LASER PRINTER

- Poster print function
- Ultra quiet
- Easy toner replacement system
- Print Speed: up to 16ppm mono A4/4ppm colour
- Print Resolution: 2400 x 600 dpi

- Total Media Capacity: 150 sheets
- Memory: 64MB
- Connection: USB, Ethernet
- Monthly Duty Cycle: 24,200 pages
- Warranty: 1 year on site

BEFORE CASHBACK YOU PAY \$399

\$299 | U0104

SAMSUNG

iP90V Portable Printer

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- Print Speed: up to 16ppm black and 12ppm colour
- Resolution: 4800 x 1200 dpi printing
- Total Media Capacity: 30 sheets
- Built-in infrared for wireless printing
- Weighs only 1.8kg
- Up to A4 size borderless photo printing
- USB connection and optional Bluetooth interfaces
- Optional battery kit



\$429 | U9077

Deskjet 460 CB Portable Printer

hp
invent

- Print Speed: up to 17ppm
- Print Resolution: 1200 x 1200 dpi
- Total Media Capacity: 50 sheets
- Memory: 32MB
- Connection: USB
- Monthly duty cycle: 500 pages



\$449 | U6875

BONUS WIRELESS CARD

Colour Laser Shot LBP-5200 Printer

Canon
advanced simplicity

- Print Speed: up to 19ppm mono/ 4ppm colour
- Print Resolution: 9600 dpi x 600 dpi
- Total Media Capacity: 125 sheets
- Memory: 8MB
- Connection: Hi-Speed USB
- 1 year warranty



\$439 | S0587

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- 1st** Panasonic TH42PX7A 42" Plasma approx value **\$2399**
2nd HP 6710s Notebook approx value **\$1299**
3rd iTunes Gift Card value **\$300**

Visit printeroffers.ht.com.au for full terms and conditions.

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Colour LaserJet 1600 Printer

- Print Speed: up to 8ppm mono/colour
- Print Resolution: 600 x 600 dpi
- Total Media Capacity: 250 sheets
- Memory: 16MB
- Connection: Hi-Speed USB
- Warranty: 1 year return to base

BONUS

\$399 | T6120

**BONUS \$50 COLES
MYER GIFT CARD²**

Colour LaserJet 2600N Printer

- Print Speed: up to 8ppm mono/
8ppm colour
- Print Resolution: 600 x 600 dpi
- Total Media Capacity: 250 sheets
- Memory: 16MB
- Connection: Hi-Speed USB, Ethernet
10/100Base-TX
- Monthly Duty Cycle: 35,000 pages
- Warranty: 1 year

\$499 | S2505

**BONUS \$100 COLES
MYER GIFT CARD²**

Colour LaserJet 2605DN Printer



- Print Speed: up to 12ppm Mono/
10ppm Colour
- Resolution: 600 x 600 dpi
- Memory: 64MB
(expandable 320MB)
- Connection: Hi-Speed USB, Ethernet
10/100Base-TX
- Duplex/Networked
- Monthly Duty Cycle: 35,000 pages
- Warranty: 1 year

\$779

T7115 | RENT \$9.01/wk*

OfficeJet Pro K5400DTN



- Print speed: Up to 36ppm mono/35ppm colour
- Print Resolution: 4800 dpi colour
- Duplex (dual sided) printing
- Total Media Capacity: 600 sheets
- PCL 3 support
- Extra paper tray (total paper holding 600 pages)
- Built in networking



30 DAY MONEY BACK GUARANTEE³

\$379 | U7751

Stylus Photo RX610 Inkjet Printer



The all-in-one photo printer for professional printing results

- Epson Claria ultra high definition Photographic ink
- Fast print speeds of up to 38ppm
- 4 x 6 photo prints from 12 secs
- Economical Intellidye™ individual 6 colour cartridge system
- 2.5" LCD viewer
- CD/DVD printing

**\$50
CASHBACK⁴**

\$249 | V2278

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PhotoSmart C5280 All-In-One



- Printer/Copier/Scanner
- Print Speed: up to 32ppm
mono/up to 24ppm colour
- In-Built card reader
- CD/DVD print capability
- 2.4" Colour LCD Screen
- Connection: USB
- Warranty: 1 year

BONUS



\$189 | U9770

BONUS DIGITAL PHOTO FRAME⁵

between 27/09/07 and 13/01/08. See epson.ht.com.au for details. ⁵ Digital photo frame via redemption from HP on purchases between 01/11/07 and 30/11/07 see hp.ht.com.au for more details. \$14.95 redemption fee on HP photo frame may apply.

LaserJet 2840

- Printer/Copier/Scanner/ Fax
- 7-in-1 card reader
- Print speed: Up to 19ppm mono/4ppm colour
- Print Resolution: Up to 600 x 1200 dpi mono/ up to 600 x 600 dpi colour
- Scan Resolution: 1200 x 1200 dpi
- Connection: Hi-Speed USB, Ethernet
- Warranty: 1 year onsite
- Windows and Mac compatible



\$1199 | S1217 | RENT \$13.87/wk*

● **BONUS** 2 YEAR WARRANTY* & BLACK PRINT CARTRIDGE*

Officejet L7580

- Print, Scan, Copy, Fax
- Print & copy speed: up to 35ppm colour
- Print Resolution: up to 4800 x 1200 dpi
- Scan Resolution: up to 2400 x 4800 dpi
- Connection: USB, Ethernet 10 Base-T
- Warranty: 1 year

30 DAY MONEY BACK GUARANTEE*



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\$499 | U8052

PIXMA MP830

- Printer/Copier/Scanner/Fax
- Print Speed: up to 30ppm mono/up to 24ppm colour
- Print Resolution: up to 600 x 600 dpi mono / up to 9600 x 2400 dpi colour
- Scan Resolution: 2400 x 4800 dpi
- ADF & Built in Duplex
- Warranty: 1 year

Canon
advanced simplicity



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\$499 | T6987

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Because buying isn't

**CLX-3160FN****SAMSUNG**

Samsung's colour laser multifunction printer CLX-3160FN provides USB ports for you to instantly print various image files. The CLX-3160FN also features a USB Direct Scan feature and NO-NOIS technology.

- Printer/Copier/Scanner/Fax
- Print & copy speed: up to 16ppm
- Print Resolution: up to 2400 x 600 dpi
- Scan Resolution: 600 x 1200 dpi
- Standard Media Capacity: 150 sheets
- Connection: Hi-Speed USB, Ethernet 10 Base-T/100 Base-TX
- Warranty: 1 year onsite

\$799

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BEFORE CASHBACK YOU PAY \$999**Laserjet 3055 All in One Printer**

- Printer/copier/scanner/fax
- Print speed: up to 18ppm
- Print Resolution: up to 1200 x 1200 dpi
- Scan resolution: 600 dpi
- Hi-Speed USB, Ethernet
- Warranty: 1 year

BONUS

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- World's Smallest Colour Laser Multifunction Printer - designed to fit your desktop
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\$200 CASHBACK¹

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*For terms and conditions, including RentSmart and Online Only, see page 47. ¹Cashback by redemption from Samsung. Valid for purchases 01/11/07 to 31/12/07. Visit samsung.ht.com.au for full terms & conditions. ²Bonus 2 year warranty and black ink cartridge by redemption from HP. Valid for purchases 1/08/07 to 31/11/07. Visit hp.ht.com.au for full terms & conditions. ³Money Back Guarantee by redemption from HP on purchases until 13/01/08 see hp.ht.com.au for more details.

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V1033 | p. 4

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